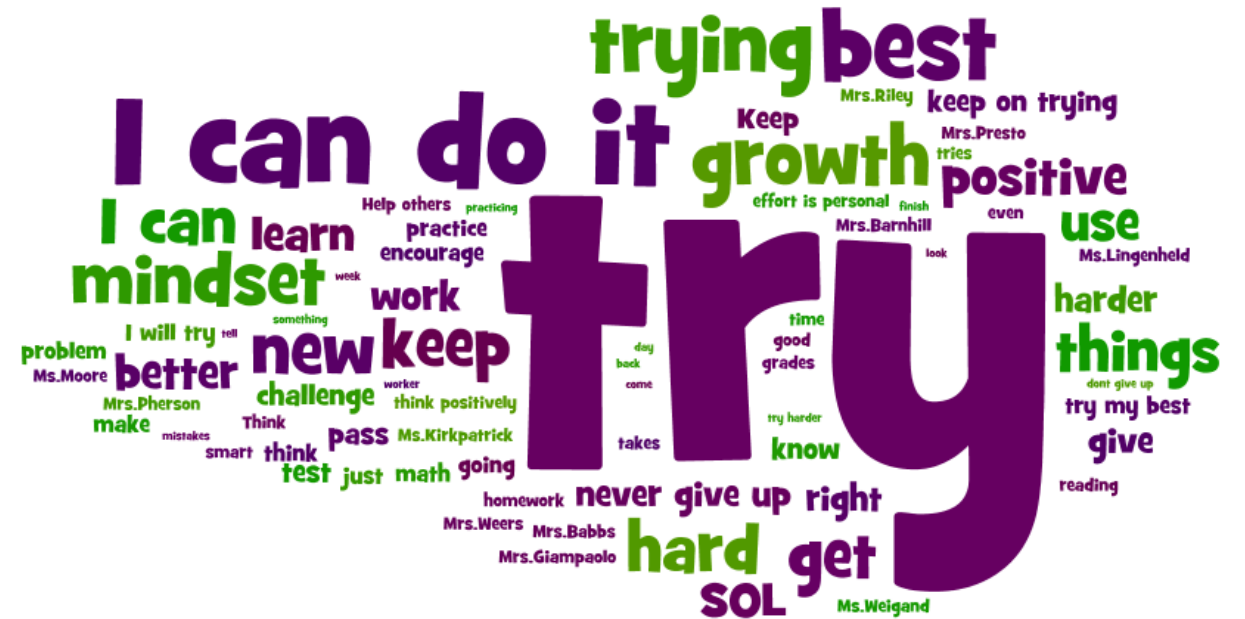
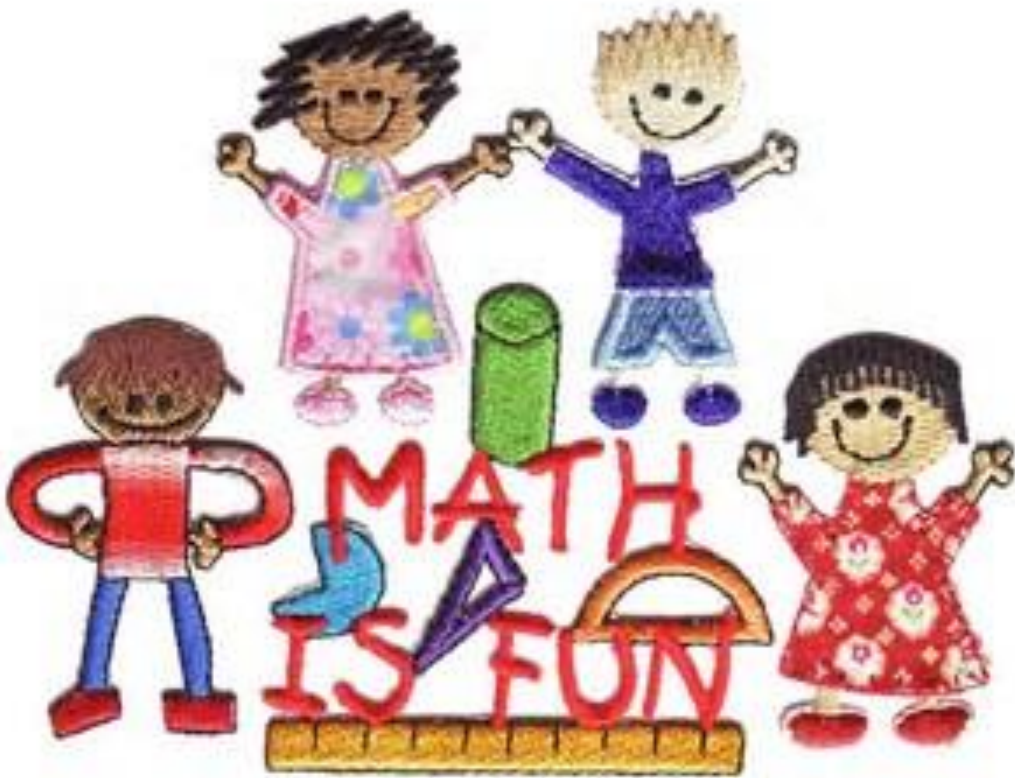


Subitizing!

A Quick Recognition of Quantities



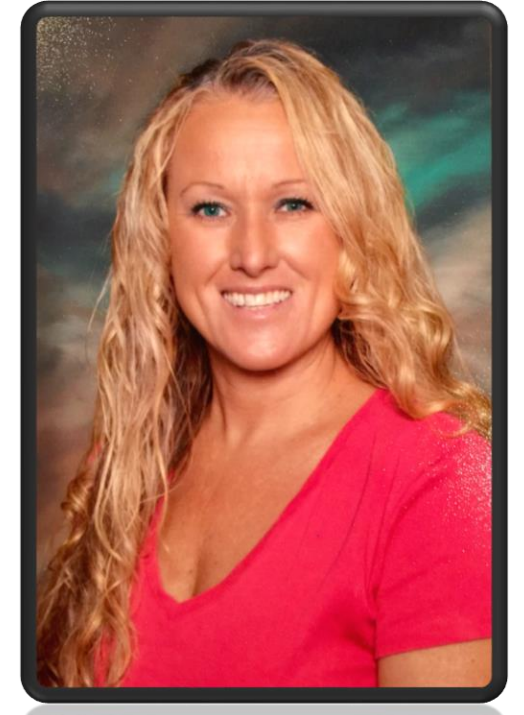
**Mary
Dickerson**
DICKMK@FUSD.NET



**Jackie
Piddington**
PIDDJ1@FUSD.NET



**Amber
Barrett**
BARRAM@FUSD.NET



Fontana Unified School District

EVERY STUDENT SUCCESSFUL | ENGAGING SCHOOLS | EMPOWERED COMMUNITIES





Welcome to the KNP!

A growing system of resources and professional learning for teachers of numeracy.

- Exemplary student learning experiences, built around the Add+Vantage MR (AVMR) constructs and levels.
- Support for in-depth implementation of the grades K-3 Common Core Standards for Mathematics (CCSM) related to number and operation.

- Activities that support students in enacting the Common Core Standards for Mathematical Practice.
- Tools for professional learning and student-centered problem solving for Response to Intervention.
- Evidence-based instructional strategies for accelerated learning, especially for developing quantitative reasoning, robust automaticity, foundations for fluency, and efficient mental strategies.

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Subitizing:

What Is It?
Why Teach It?

Three pictures hang in front of a six-month-old child. The first shows two dots, the others show one dot and three dots. The infant hears three drumbeats. Her eyes move to the picture with three dots.

Douglas H. Clements

Young children spontaneously use the ability to recognize and discriminate small numbers of objects (Klein and Starkey 1988). But some elementary school children cannot immediately name the number of pips

showing on dice. What is this ability? When and how does it develop? Is it a special way of counting? Should we teach it?

Subitizing: A Long History

Subitizing is "instantly seeing how many." From a Latin word meaning *suddenly*, subitizing is the direct perceptual apprehension of the numerosity of a group. In the first half of the century, researchers believed that counting did not imply a true understanding of number but that subitizing did (e.g., Douglass [1925]). Many saw the role of subitizing as a developmental prerequisite to counting. Freeman (1912) suggested that whereas measurement focused on the whole and counting focused on the unit, only subitizing focused on both the whole and the unit; therefore, subitizing underlay number ideas. Carper (1942) agreed that subitizing was more accurate than counting and more effective in abstract situations.

In the second half of the century, educators developed several models of subitizing and counting. They based some models on the same notion that subitizing was a more "basic" skill than counting (Klahr and Wallace 1976; Schaeffer, Eggle-

Doug Clements, clements@acsu.buffalo.edu, teaches mathematics education courses at the State University of New York—Buffalo, Buffalo, NY 14260. He is interested in computer applications in mathematics education, the early development of mathematical ideas, and the learning and teaching of geometry.

Time to prepare this material was partially provided by "An Investigation of the Development of Elementary Children's Geometric Thinking in Computer and Noncomputer Environments," National Science Foundation research grant no. ESI-8954664. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author and do not necessarily reflect the views of the National Science Foundation.

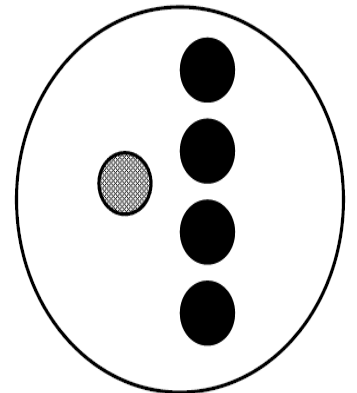
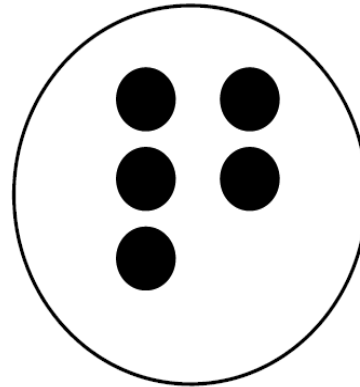
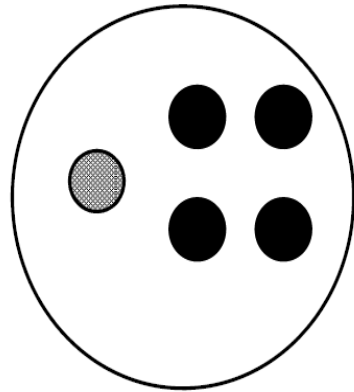
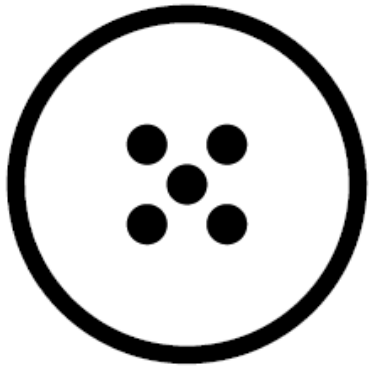
“Subitizing: What Is It? Why Teach It?”

Douglas H. Clements

“They can develop such capabilities as unitizing, counting on, and composing and decomposing numbers, as well as their understanding of arithmetic and place value—all valuable components of number sense.”



What is Subitizing?

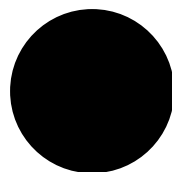
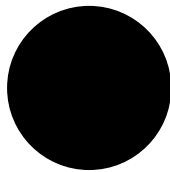
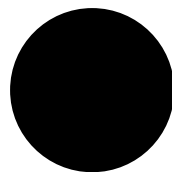
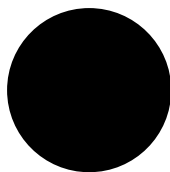
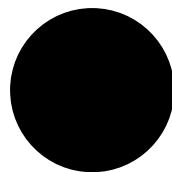
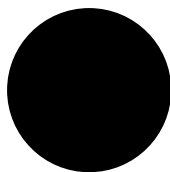


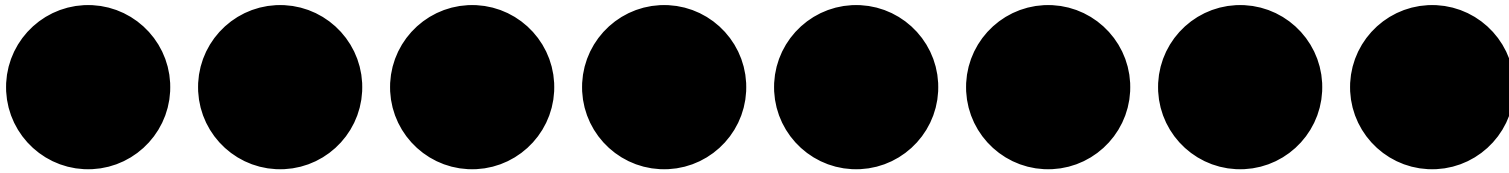
Let's Subitize! (Soooo-bi-tize)

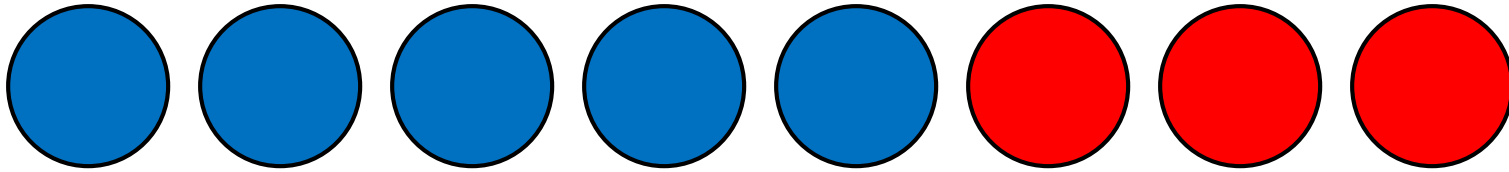


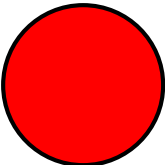
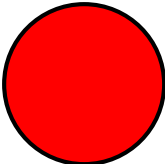
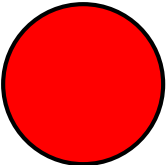
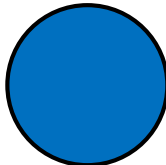
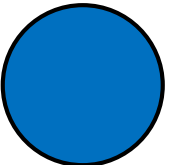
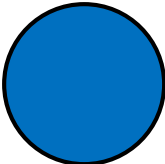
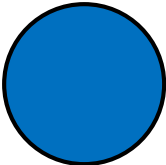
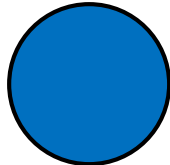
“Identify, without counting, the number of objects in a collection. (i.e. **Subitize**)”.













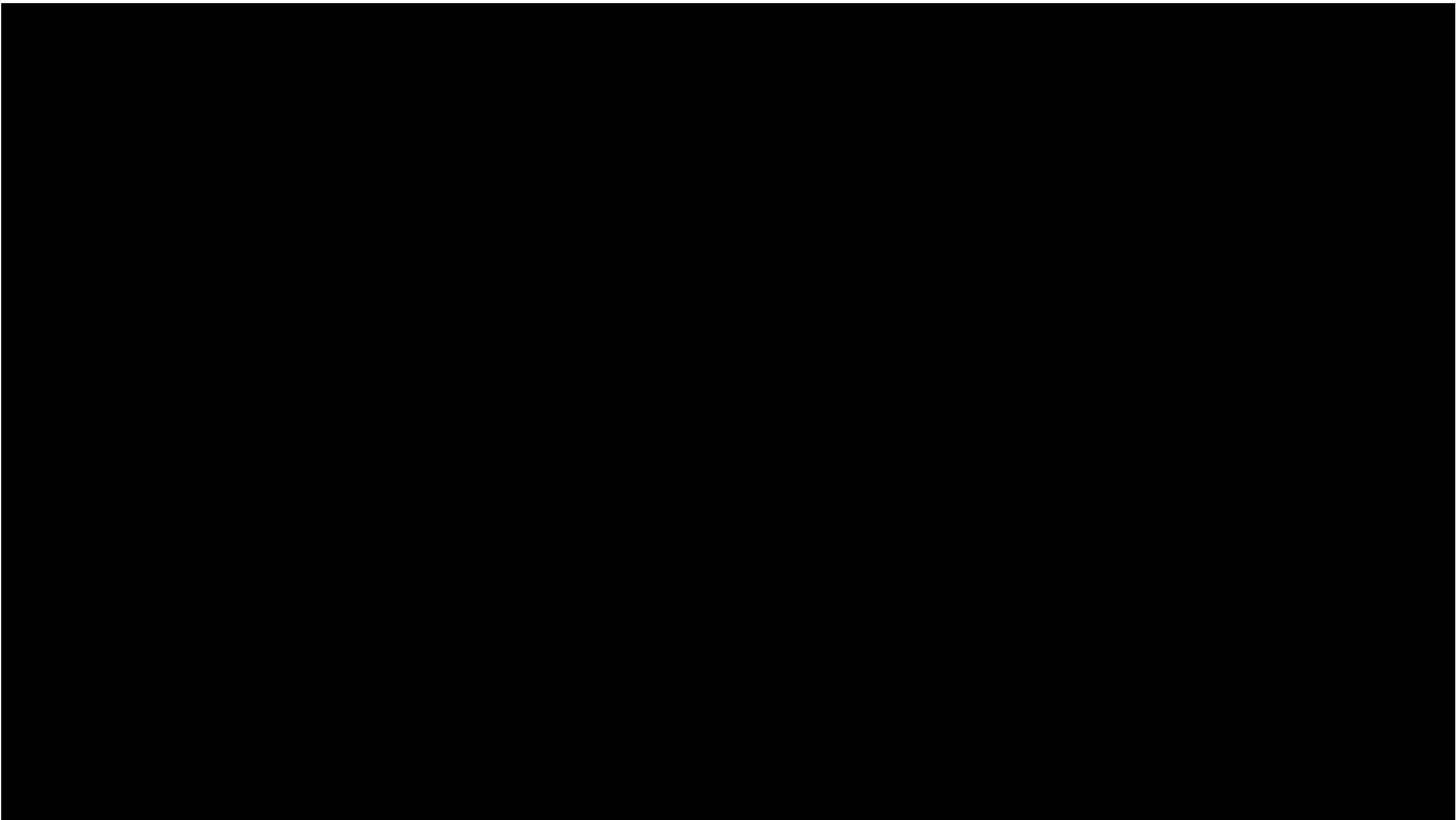
KID snippets



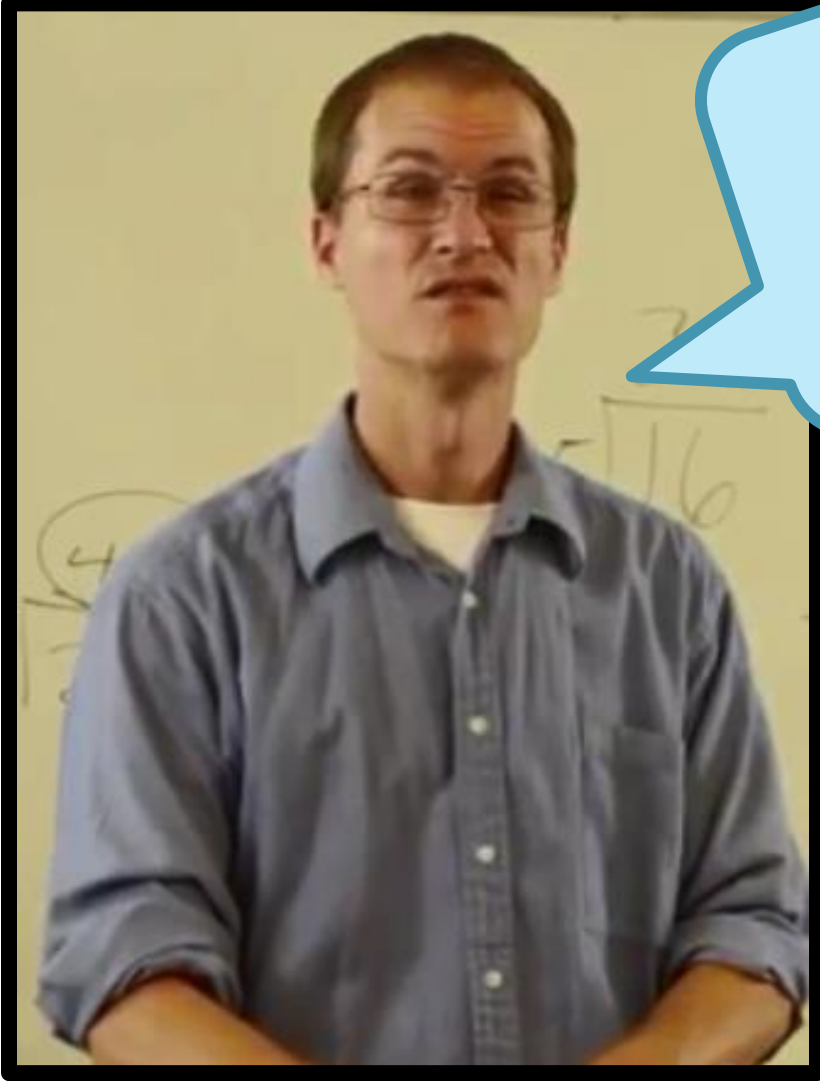
"MATH CLASS"

Why is Subitizing important?





Why is this student struggling?



Reason abstractly and quantitatively.

Mathematical Practice 2



I can use numbers and words to help me make sense of problems.

Numbers to Words

$$2 + 3 = 5$$



I have 2 yellow flowers and 3 red flowers.
How many flowers altogether?



Words to Numbers

I have 2 yellow flowers and 3 red flowers.
How many flowers altogether?



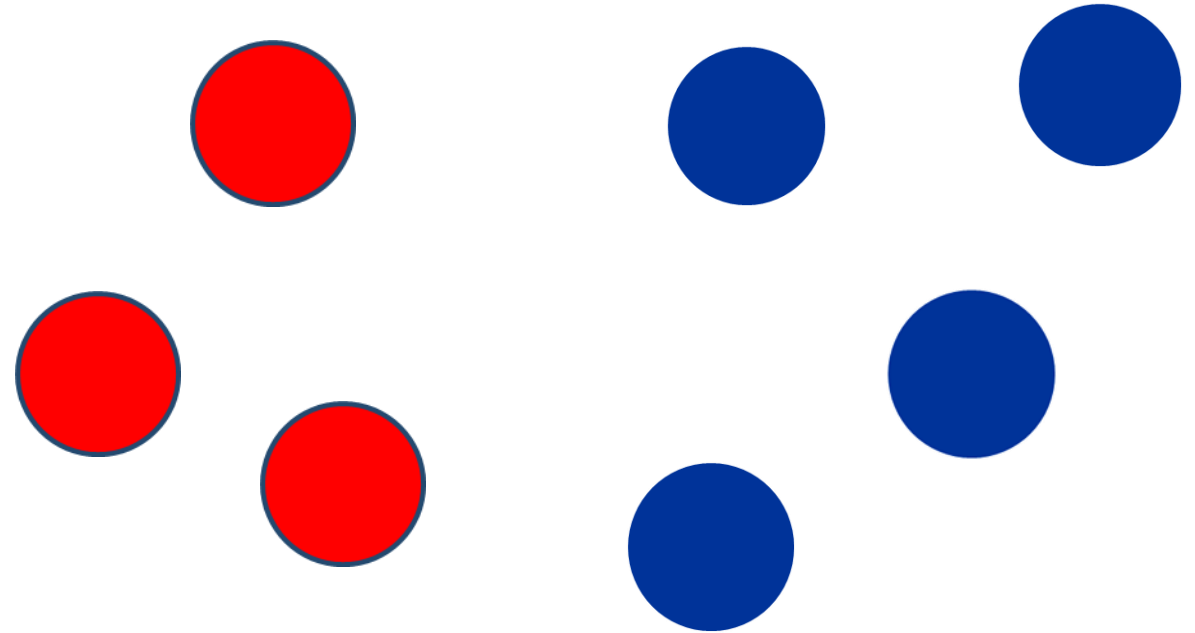
$$2 + 3 = 5$$



Abstract

$$\begin{array}{r} + \quad 3 \\ 4 \\ \hline \end{array}$$

Quantitative



STRUCTURING NUMBERS

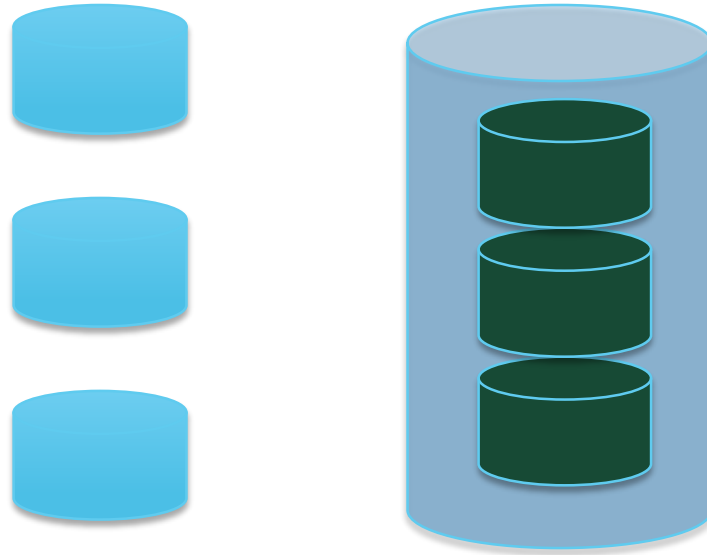
"Providing a structure that allows the person to utilize a **unit** of items rather than **single** items to determine a quantity".



Three as Unitary Units



Three as a Composite Unit



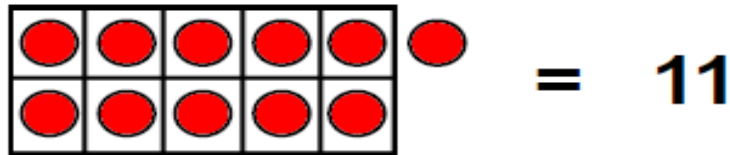
Look for and make use of structure.

Mathematical Practice 7



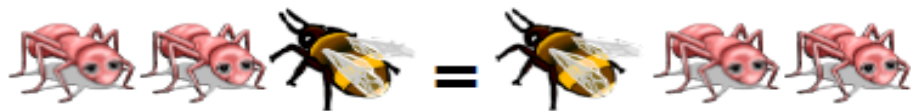
I can see and understand how numbers and shapes are put together as parts and wholes.

Numbers



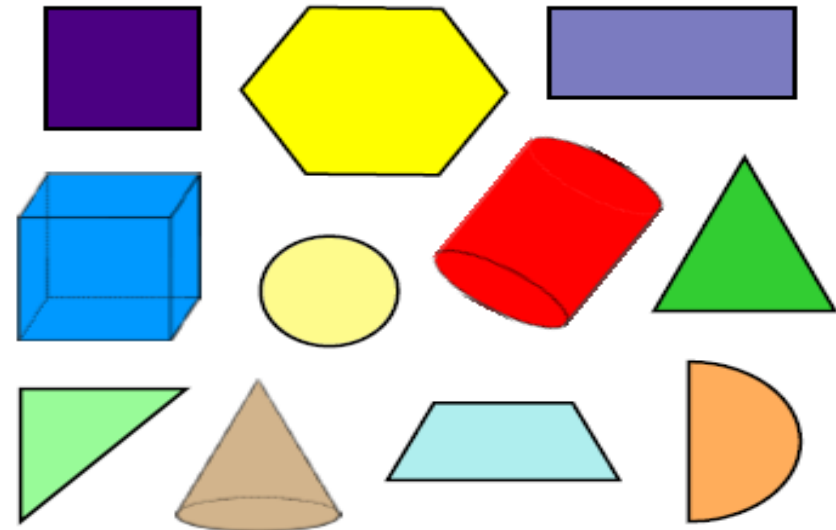
$$= 11$$

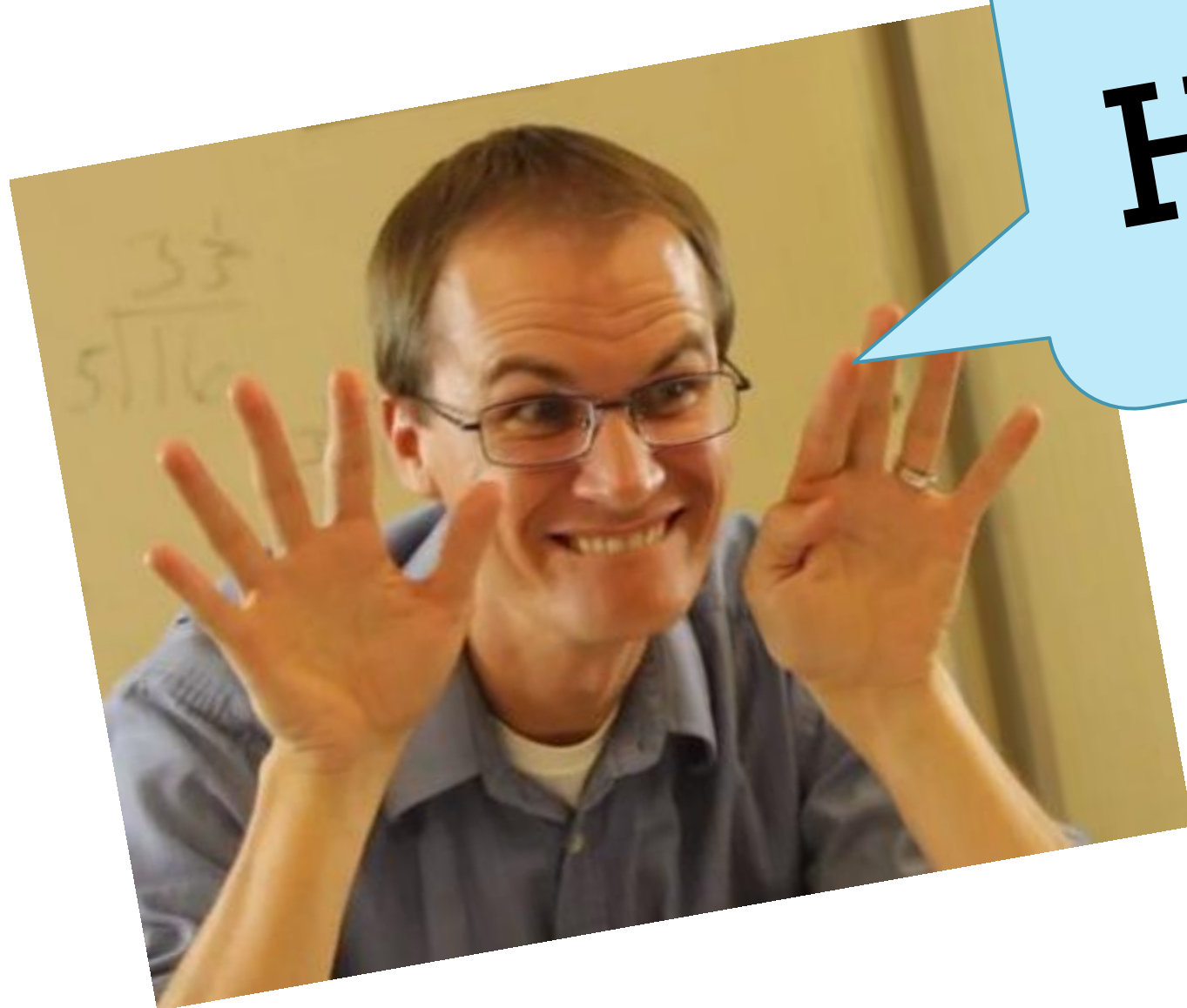
$$10 + 1 = 11$$



$$2 + 1 = 1 + 2$$

Shapes





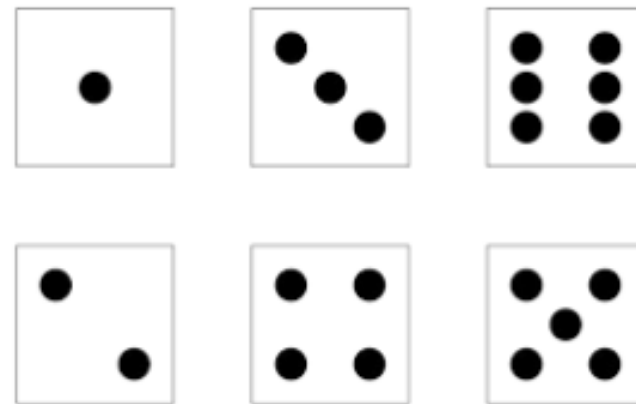
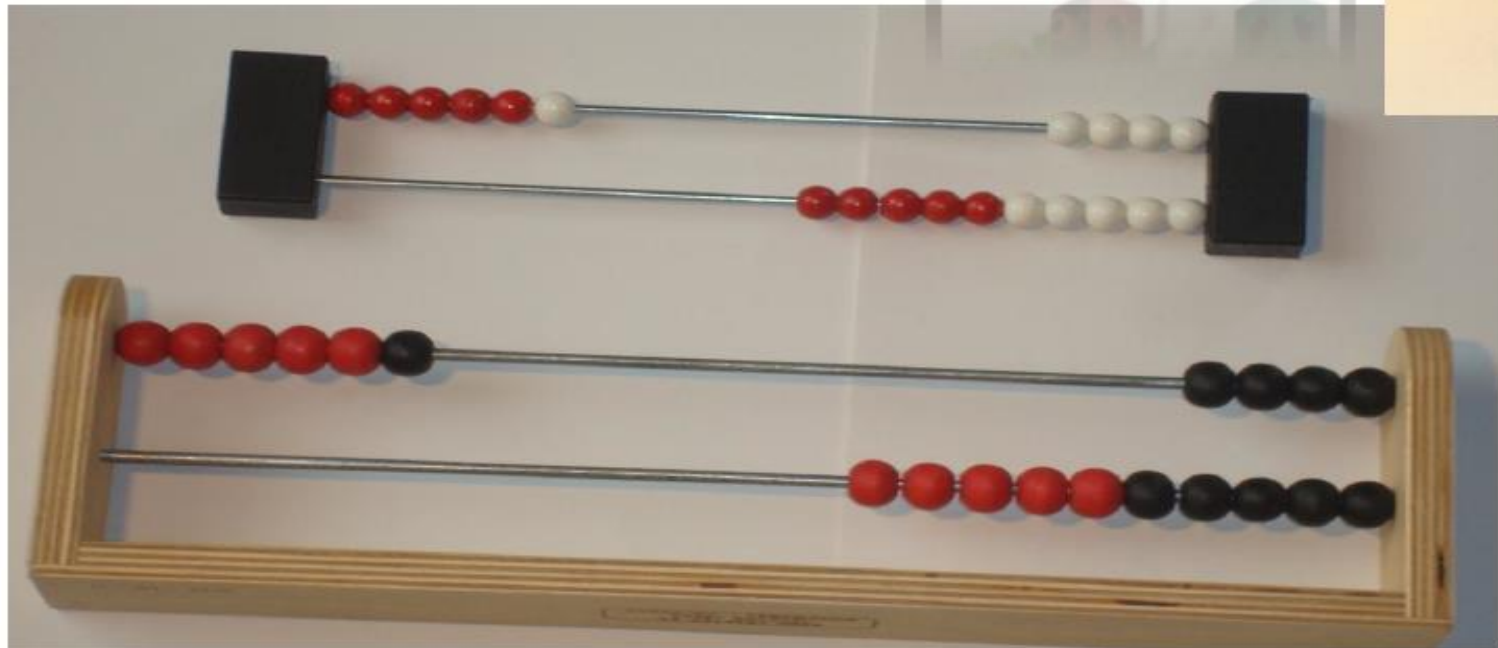
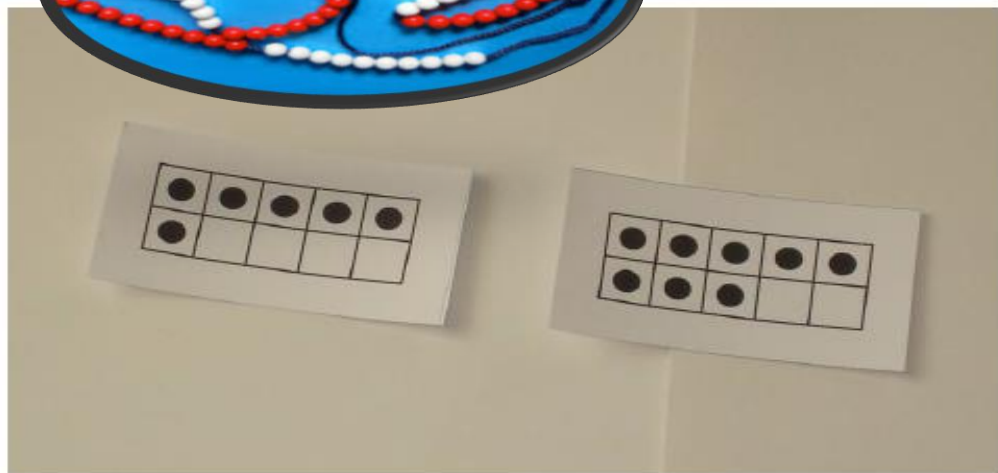
HOW?

**Structuring
Numbers
1 to 10**





Tools for Structuring



Tool #1

Finger Patterns



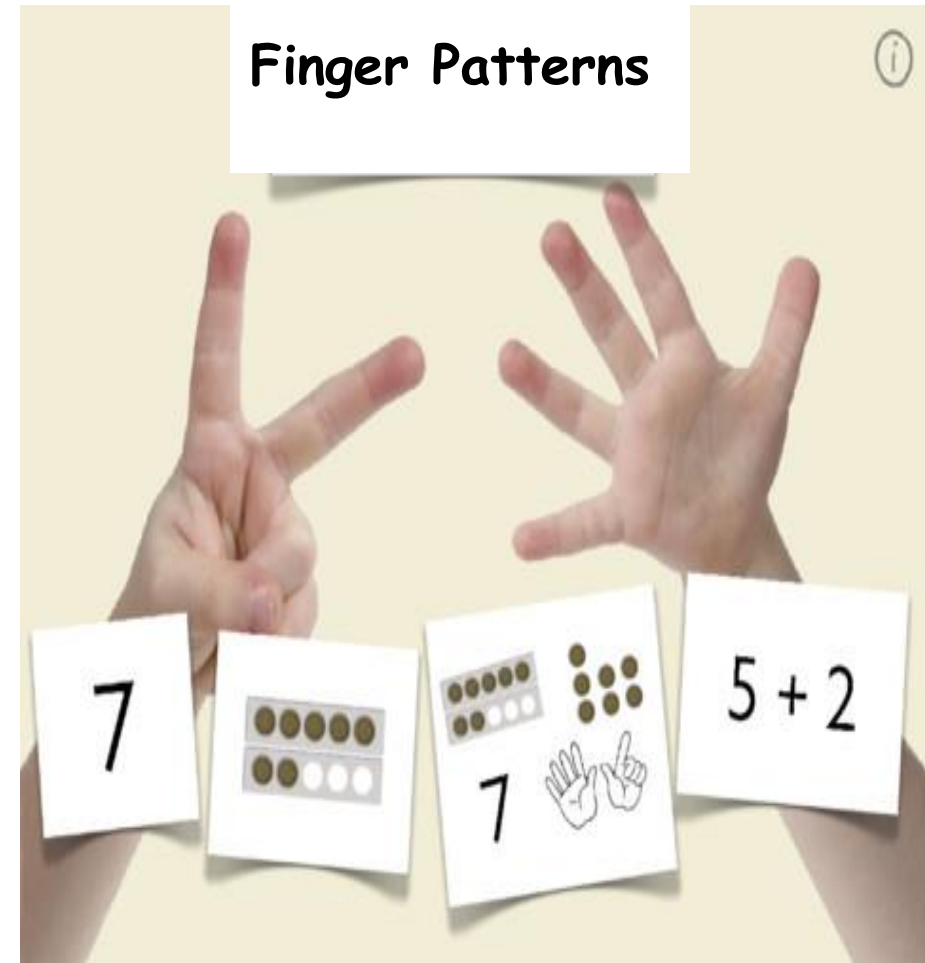
Who has seven?





verses

Building finger patterns



Flashing finger patterns



Flashing finger patterns on the top of the head

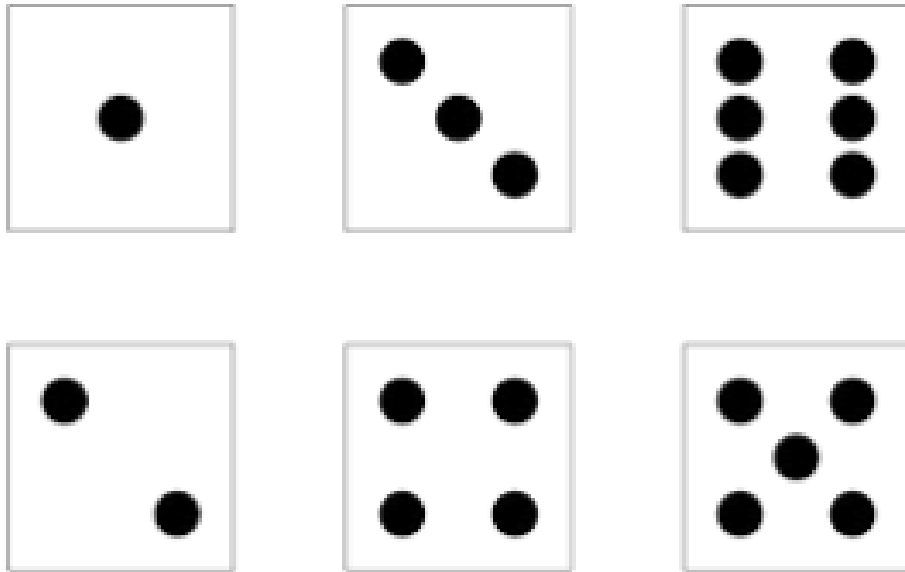
Bunny Ears



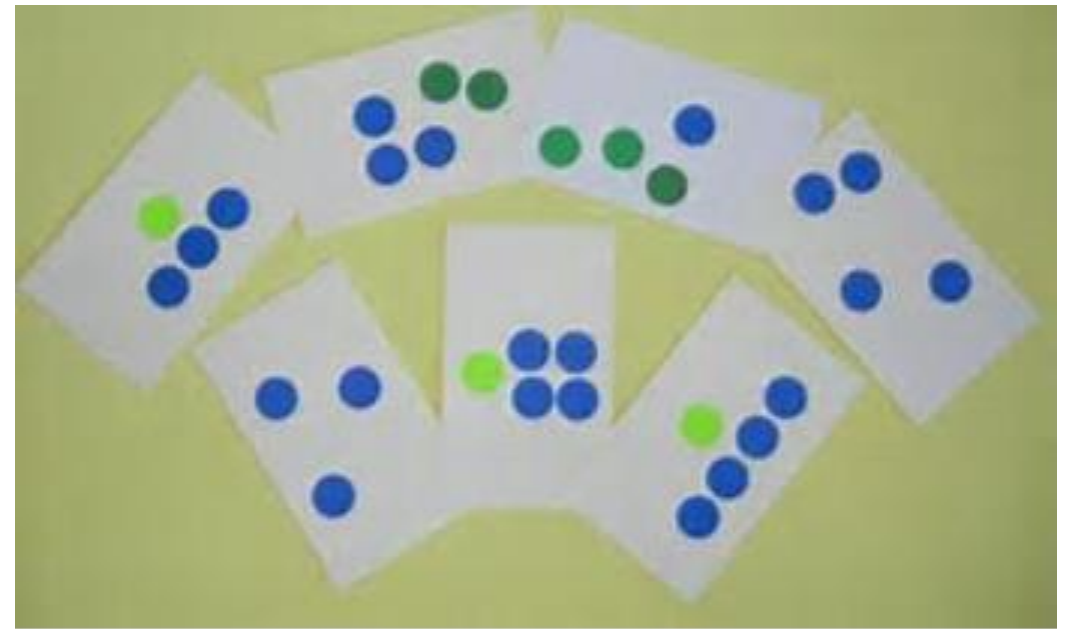
Tool #2

Spatial Configurations

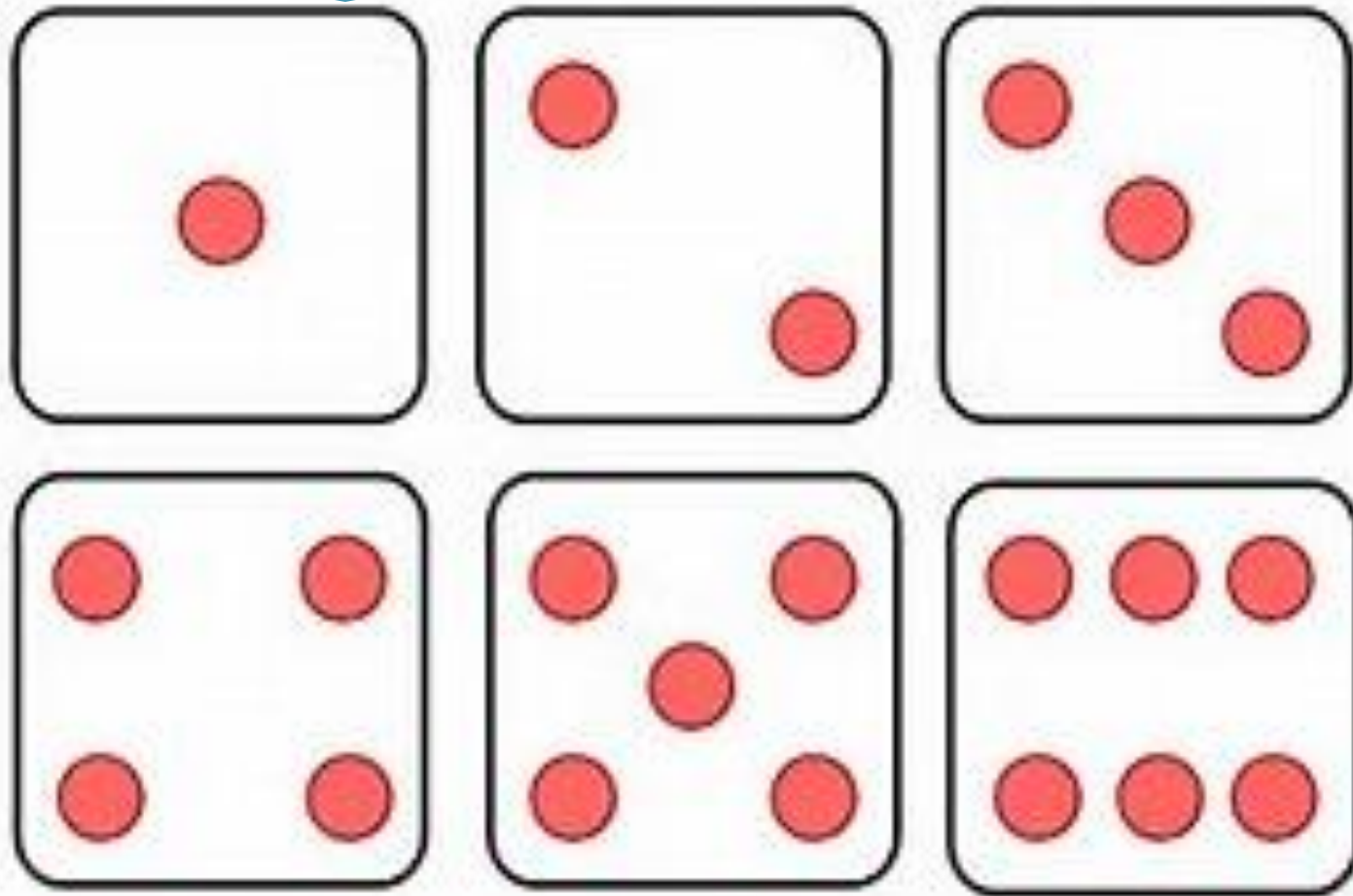
Regular Dot Patterns



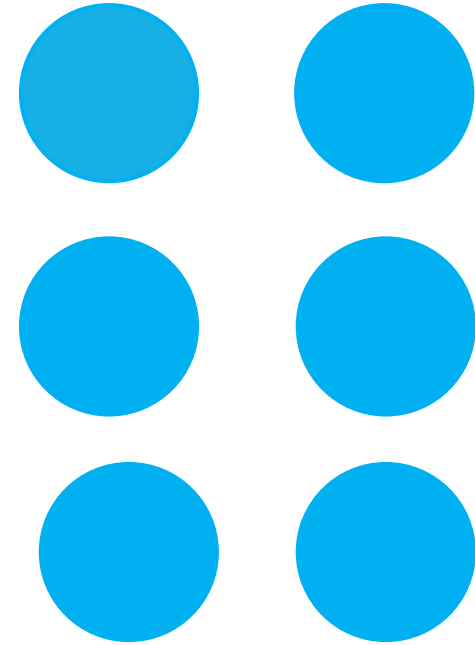
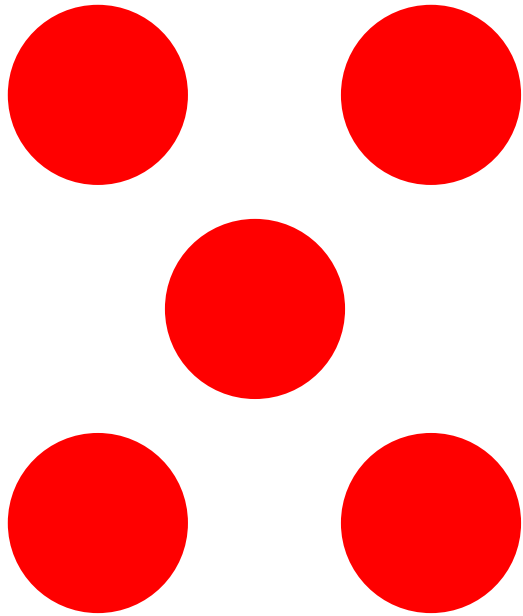
Irregular Dot Patterns



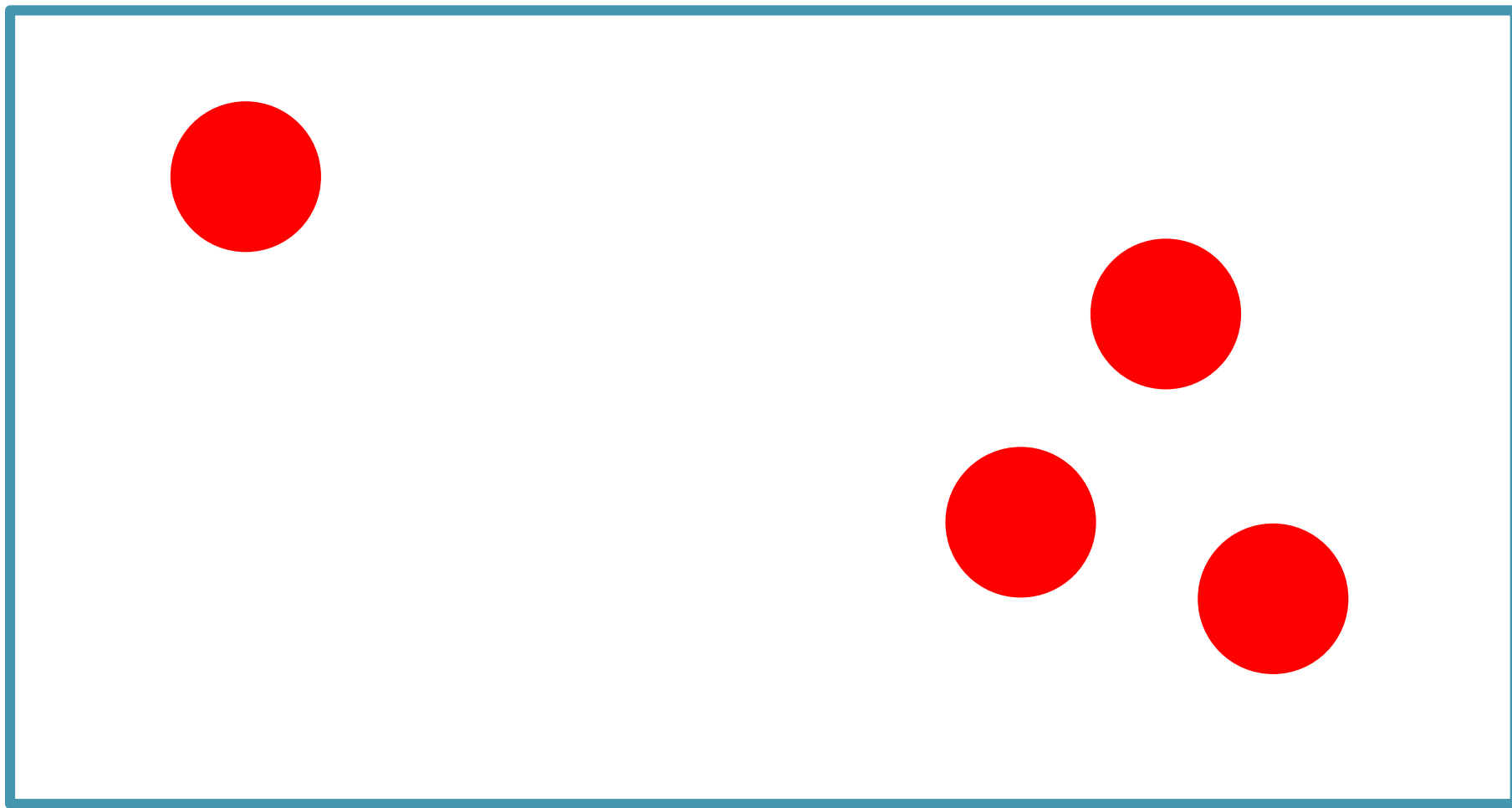
Begin with Regular Spatial Patterns to 6

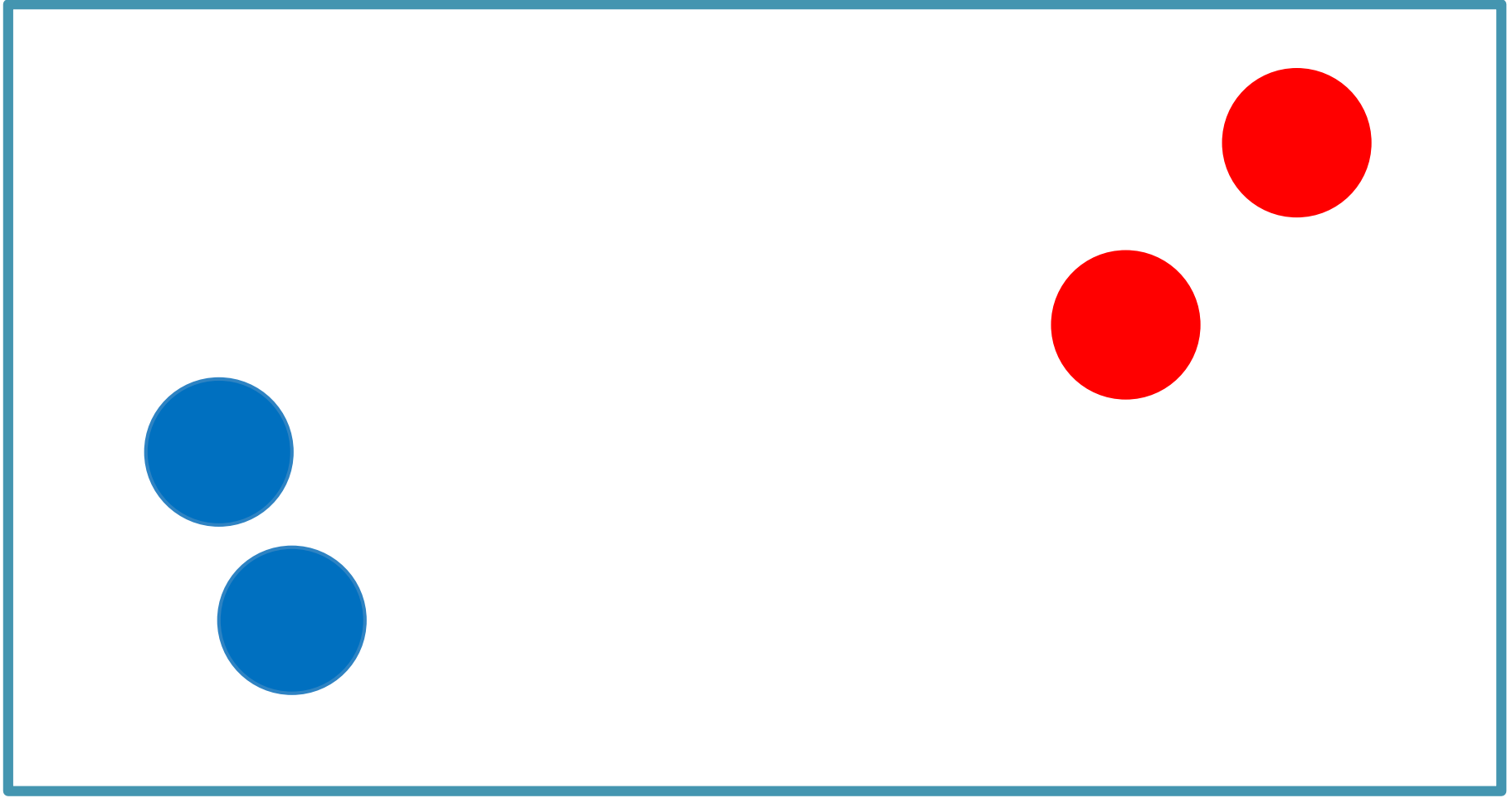


Make 2 Regular Dot Patterns within 6

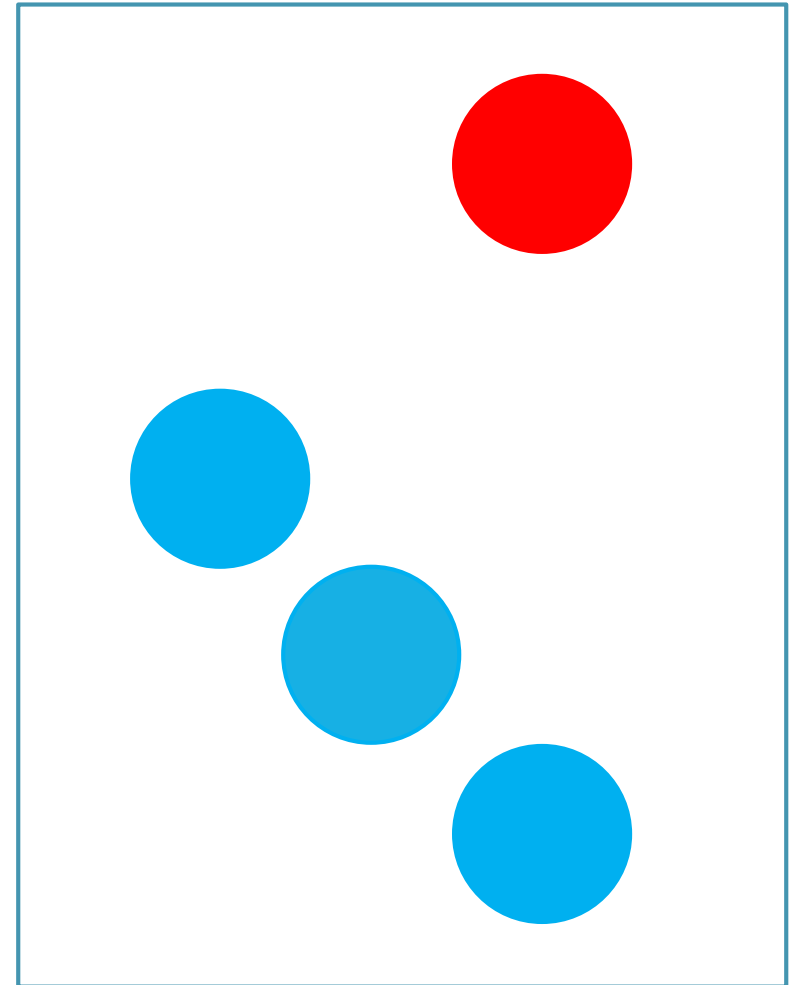
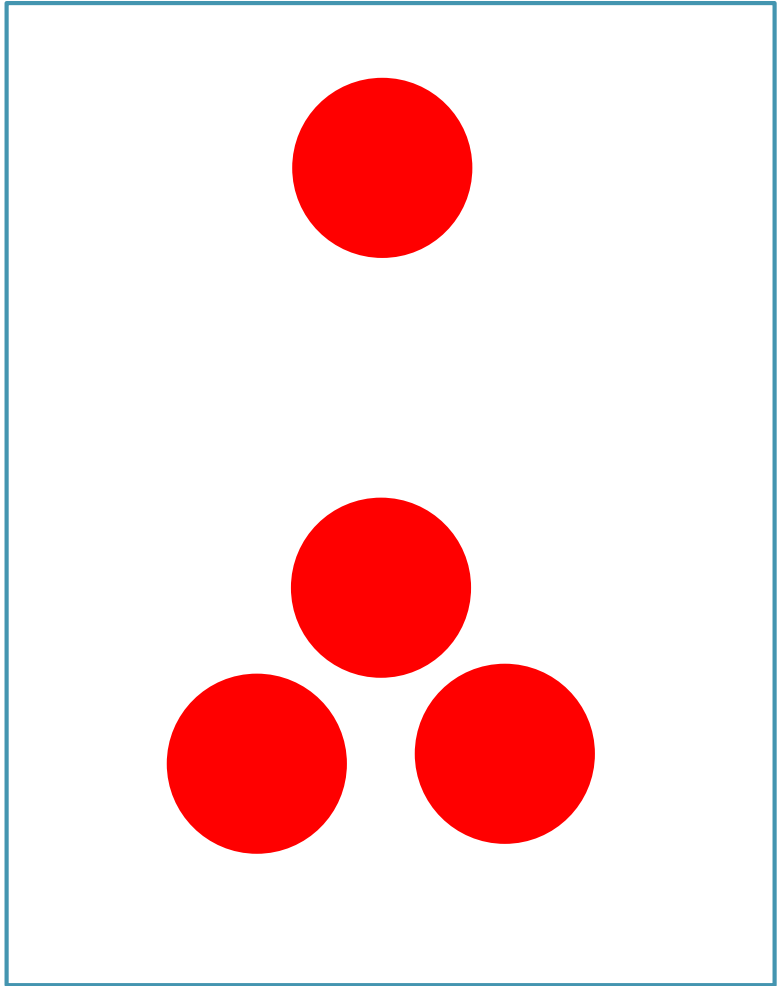


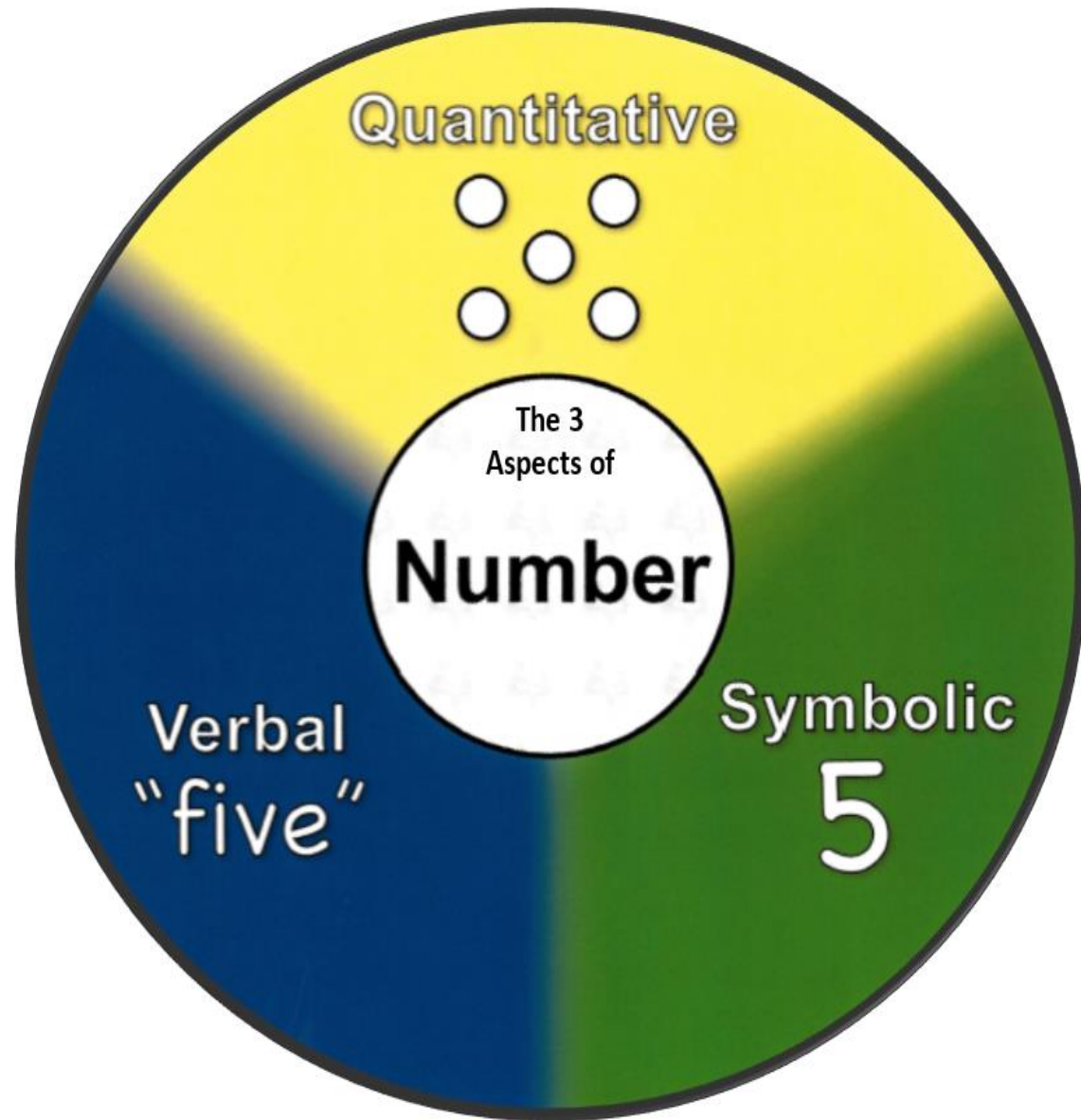
Begin with Irregular Dot Patterns to 5





Make 2 Irregular Dot Patterns within 5



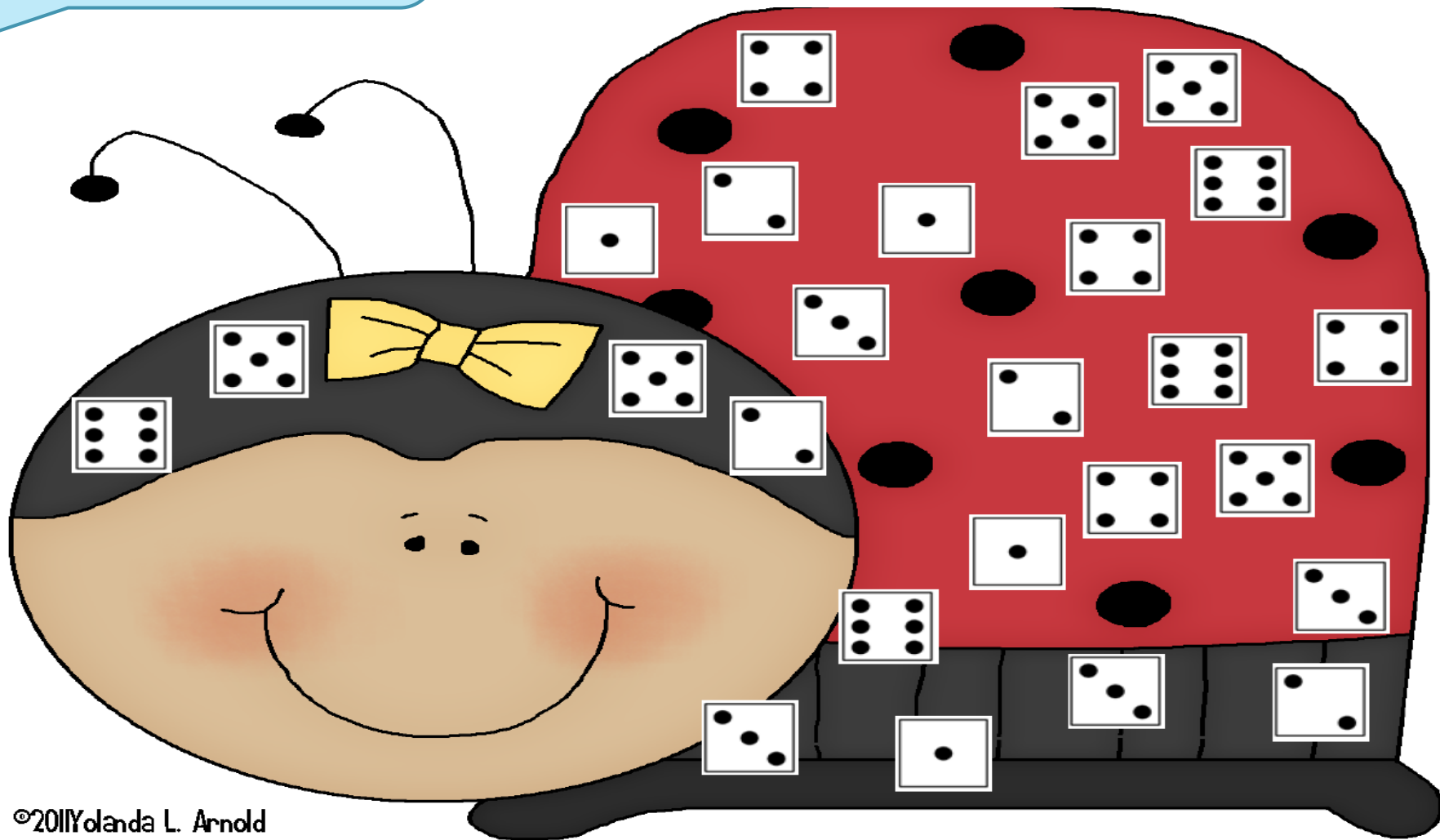


"An important instructional goal for early number instruction is for children to be able to combine and partition small numbers without counting."

Dr. Leslie Steffe



Quick Dots



©2011 Yolanda L. Arnold



Ladybug Roll & Cover

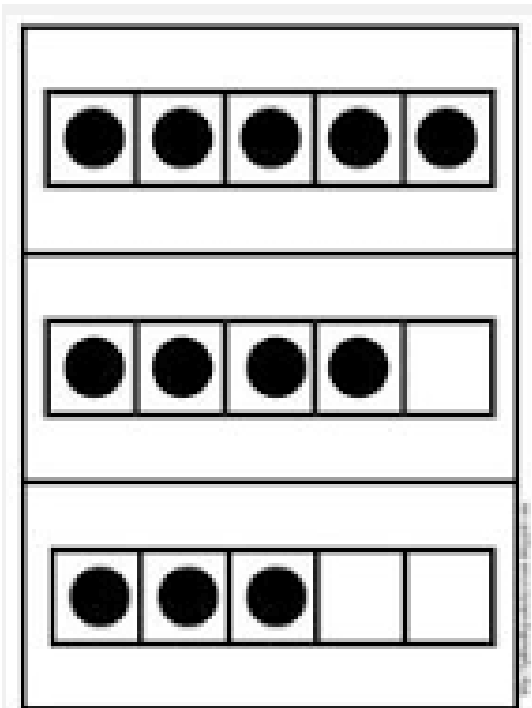
Roll 2 dice and cover their sum.



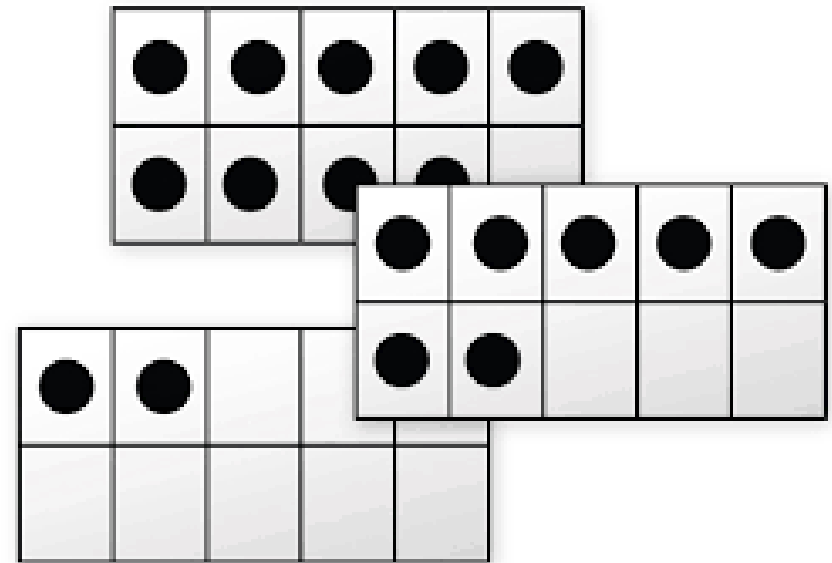
Tool #3

Five Frames and Ten Frames

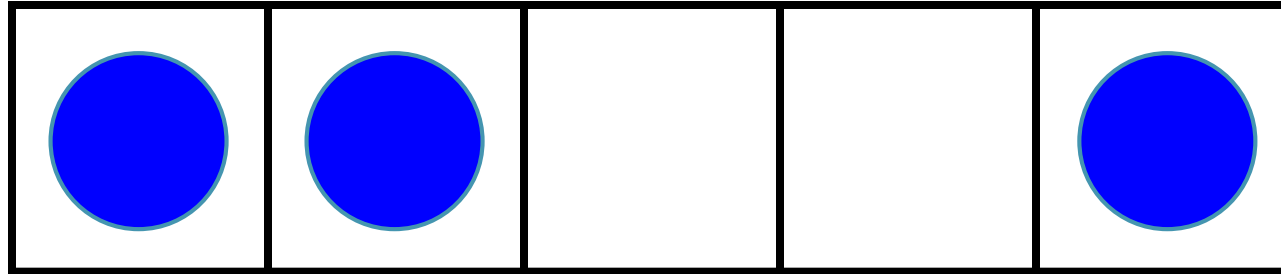
Five Frames



Ten Frames

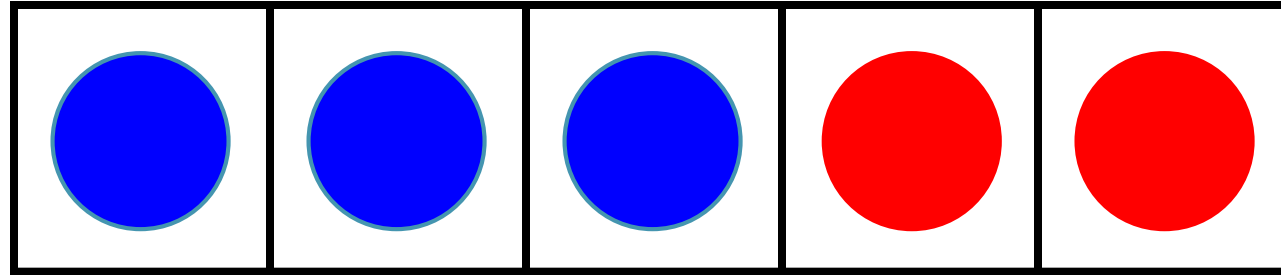


K.OA.5- Fluently add and subtract within 5.



Five Frame 1 Color









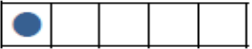







Five Frame Color Coded

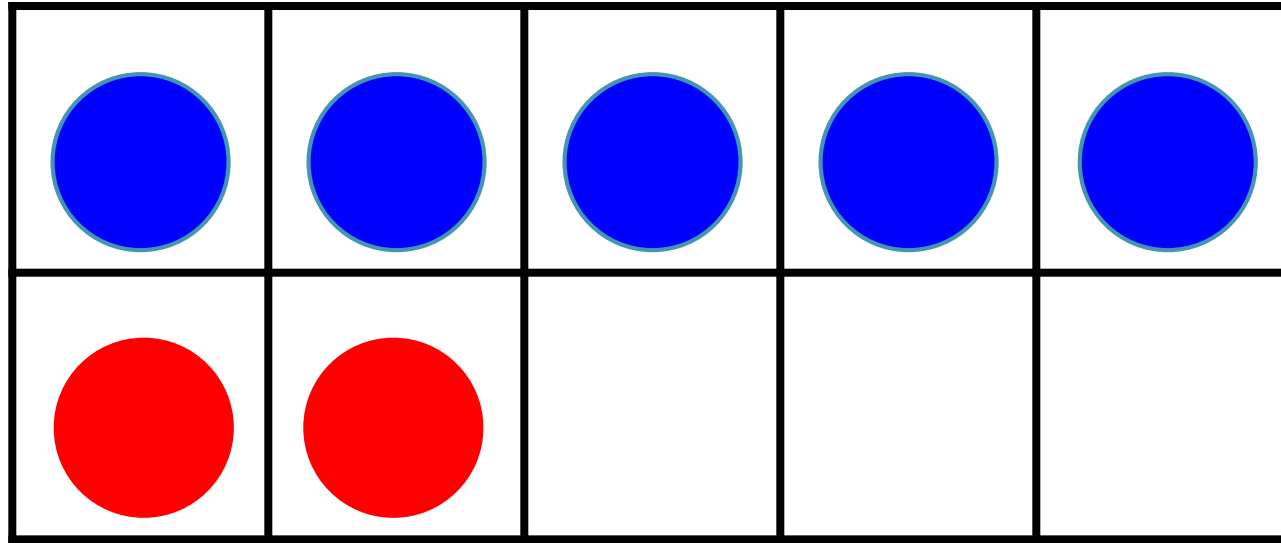


Match!

| | | |
|---|---|---|
|  | 1 |  |
|  | 3 | 4 |
| 2 |  |  |
|  | 0 | 5 |
| 2 |  | 3 |
|  | 1 |  |
| 4 |  | 5 |
| 0 |  |  |

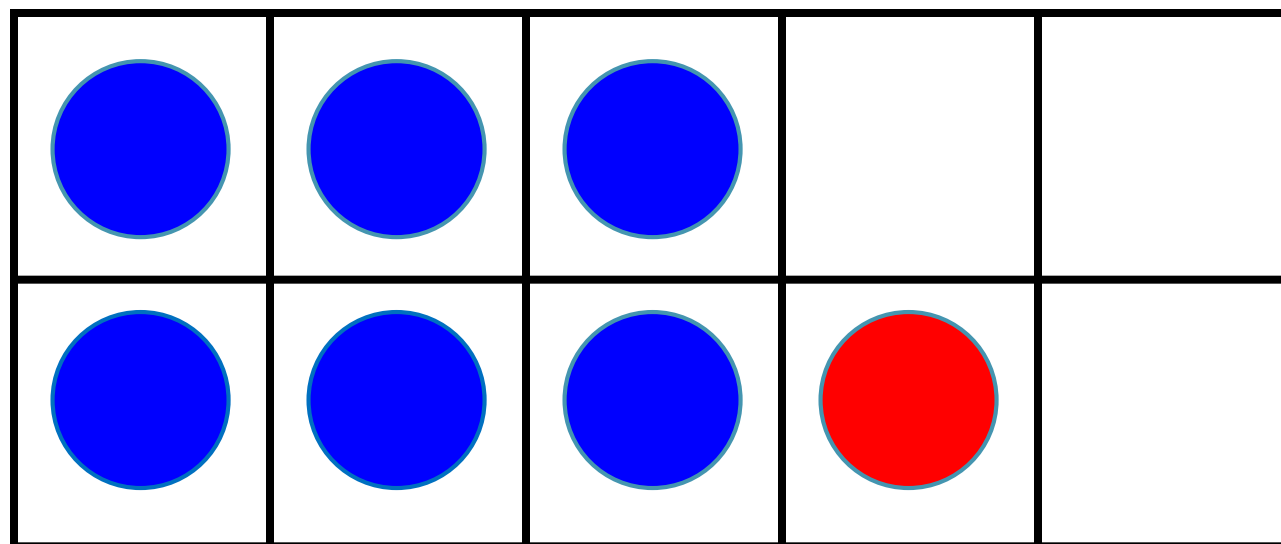


1.OA.6- Fluently add and subtract within 10.



Five-wise Pattern





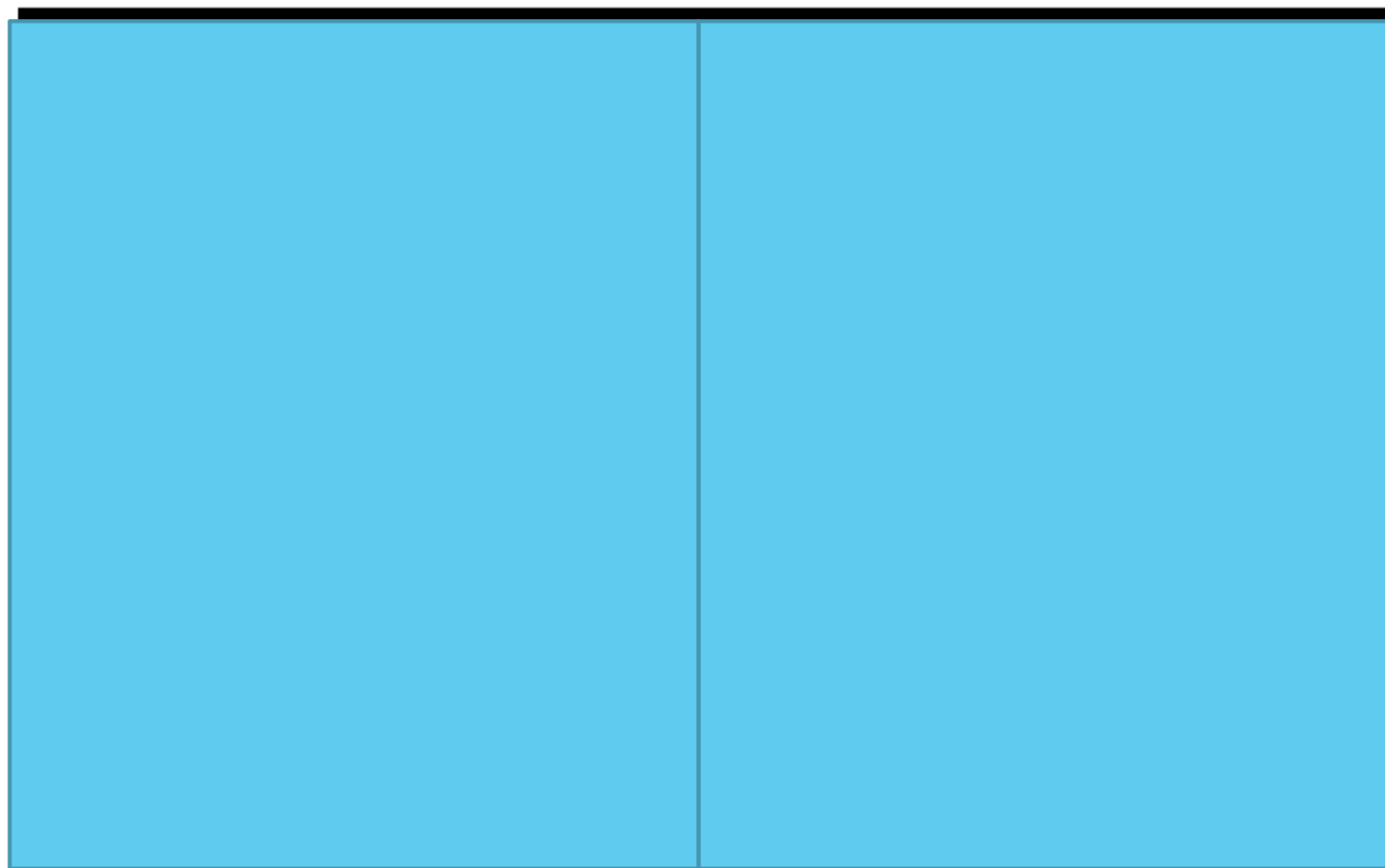
Doubles Plus

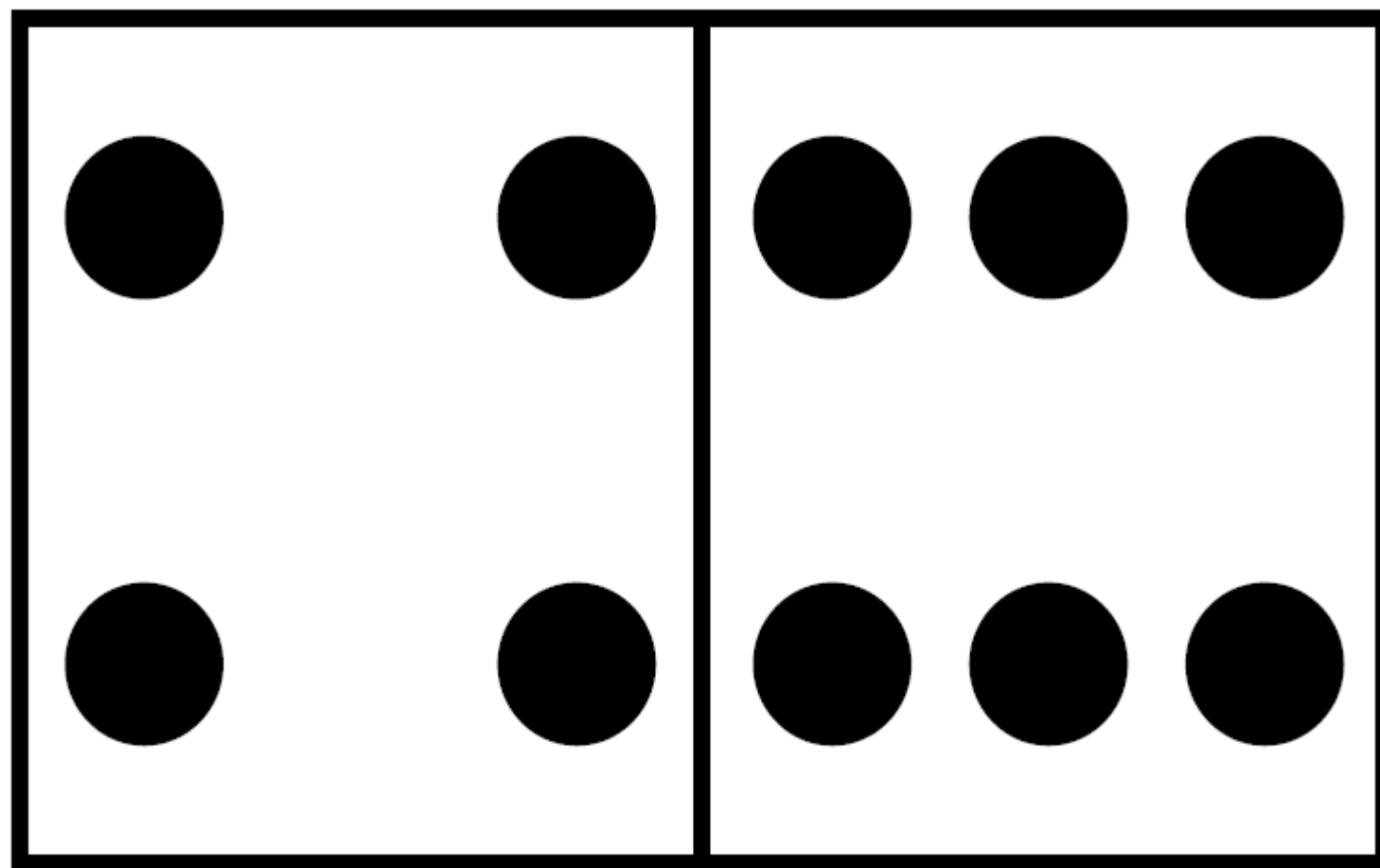


Tool #4

Dominoes





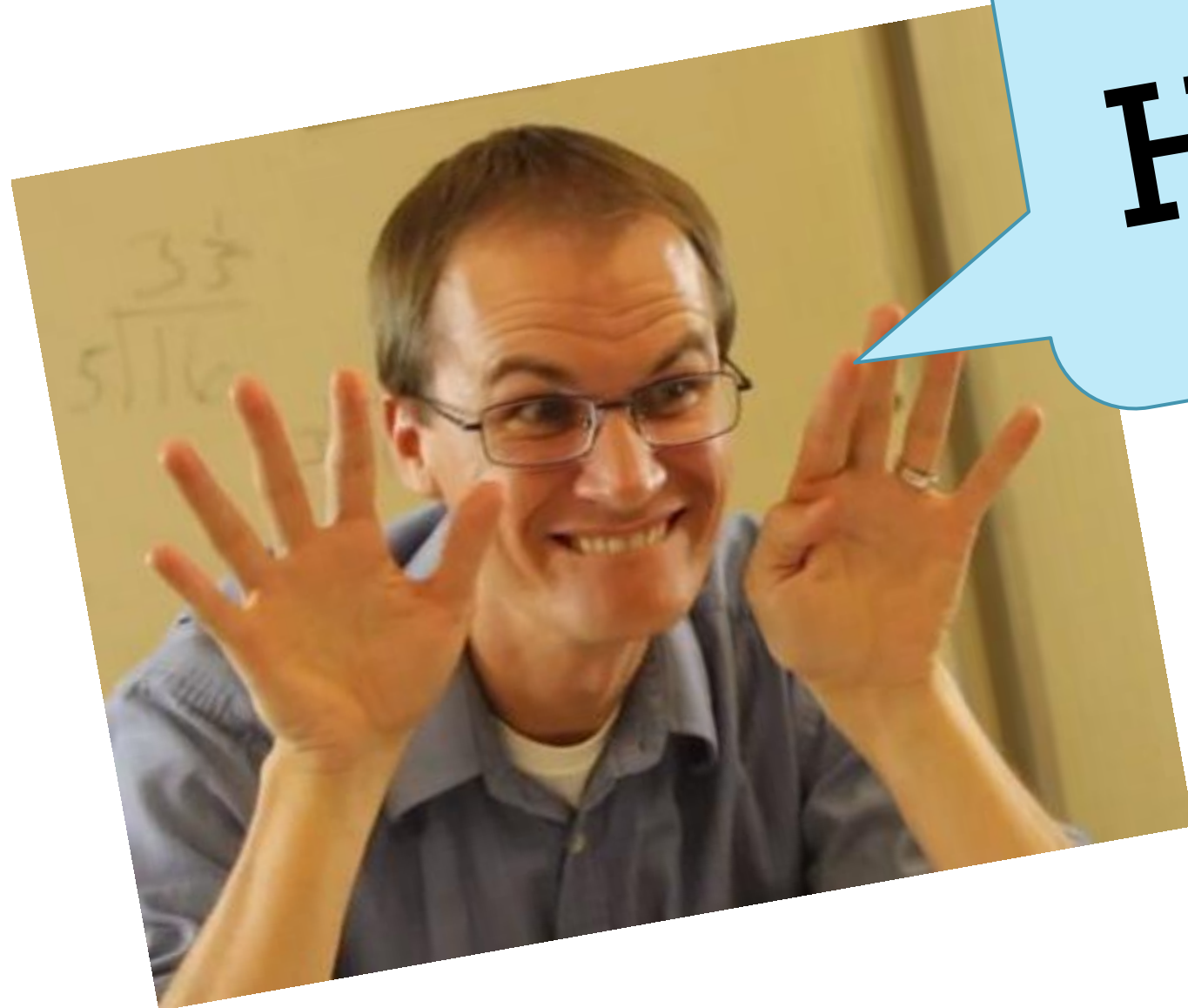


Name _____

Ready, Set, Domino!

| | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| 3 | 4 | 5 | 6 | 7 |





HOW?

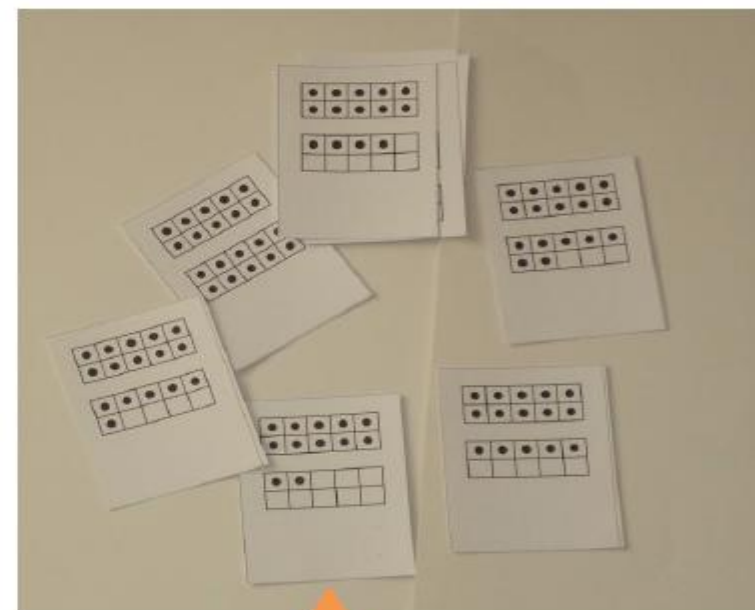
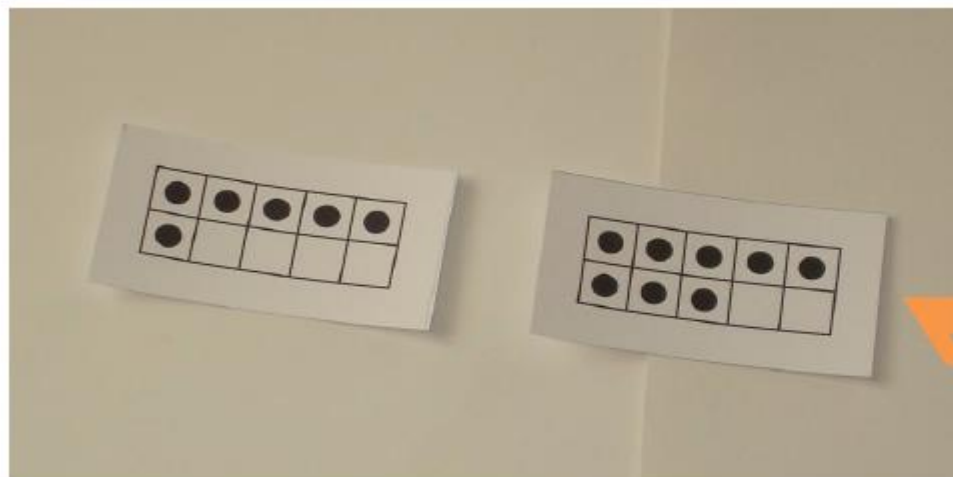
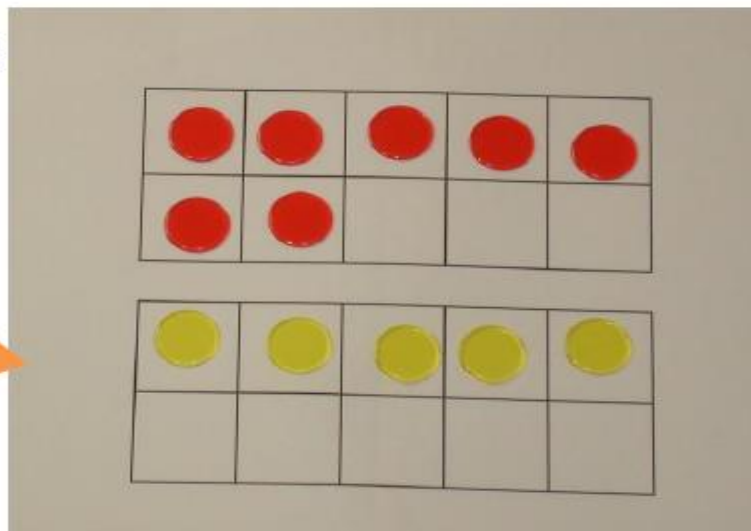
**Structuring
Numbers
1 to 20**



Tool #5

Double Ten Frames

Loose counters placed on a pair of empty 10 frames

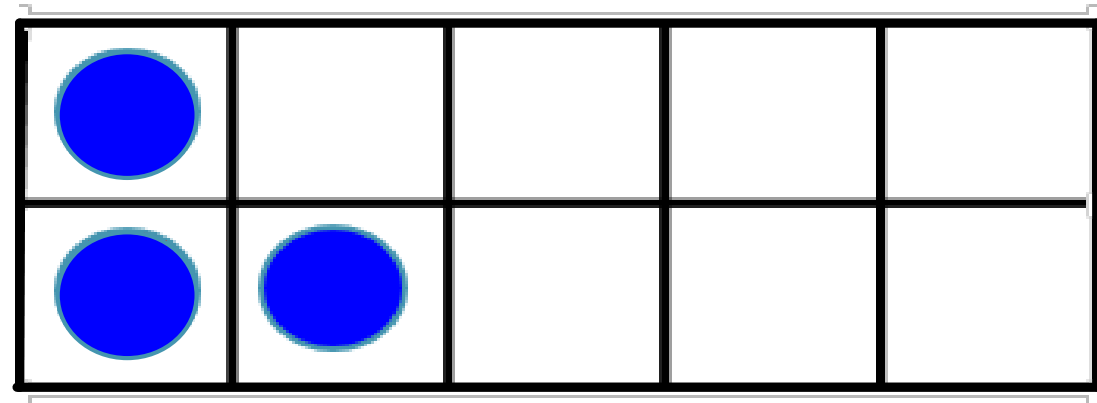
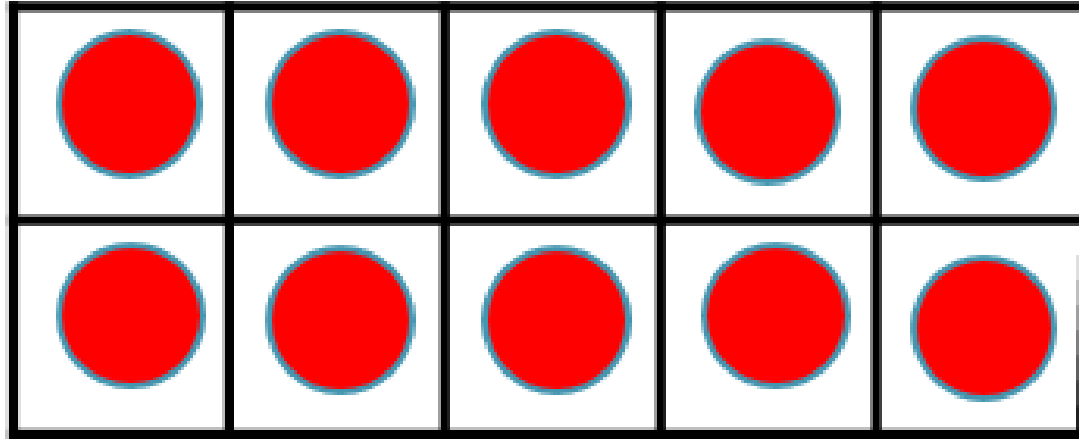


Cards showing a pair of 10 frames already filled in



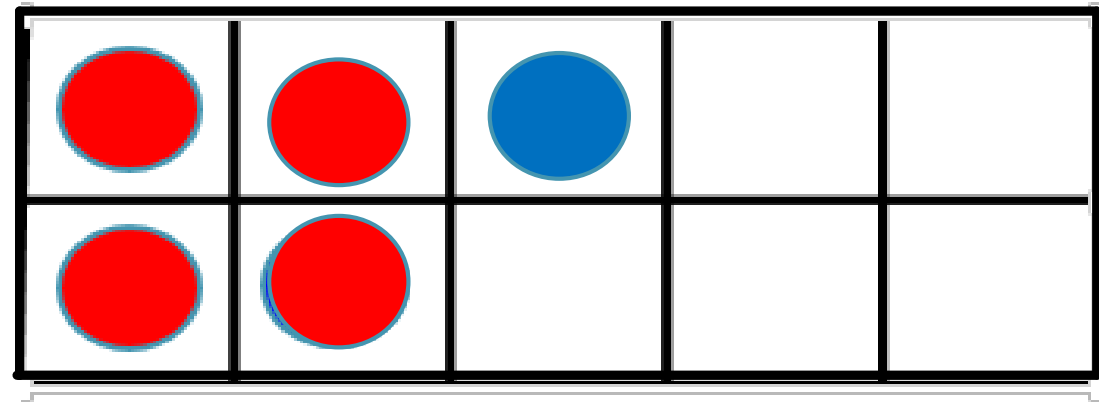
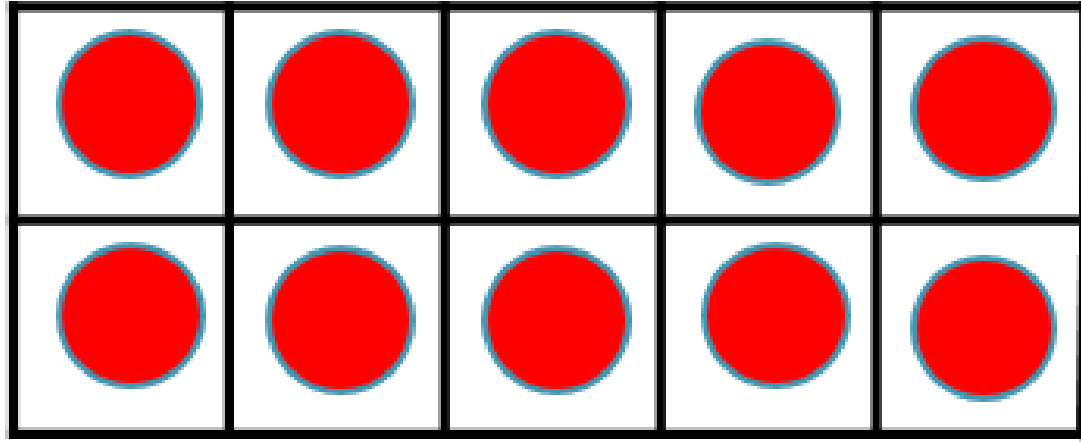
Laying two 10 frames next to each other





2.OA.2- Fluently add and subtract within 20
using mental strategies.

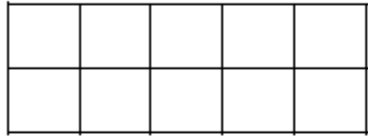




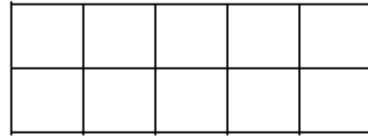
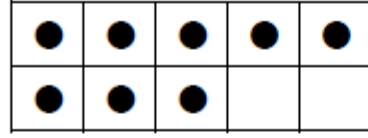
Doubles beyond 10 Plus More



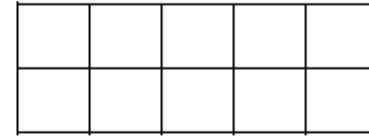
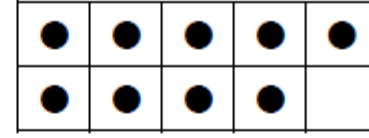
Card On My Forehead



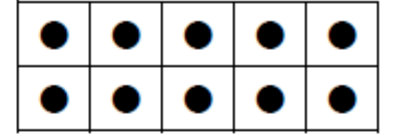
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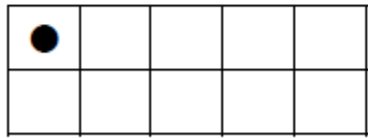
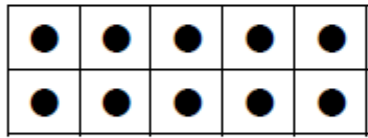
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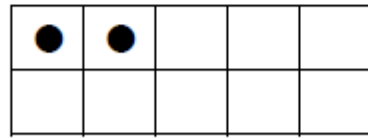
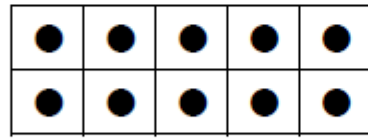
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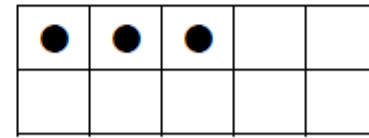
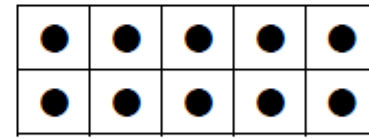
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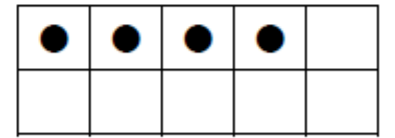
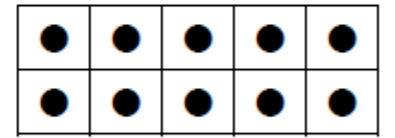
11



12



13

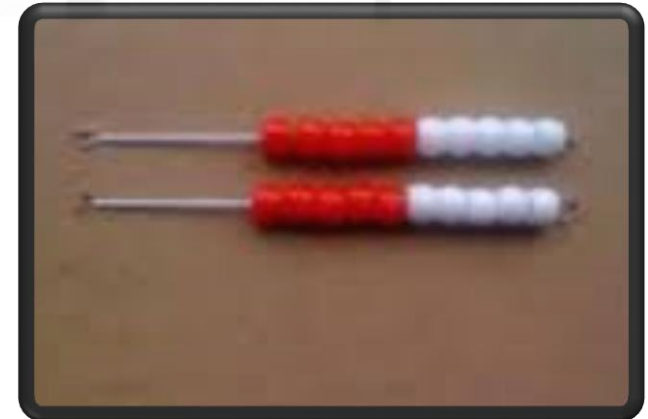
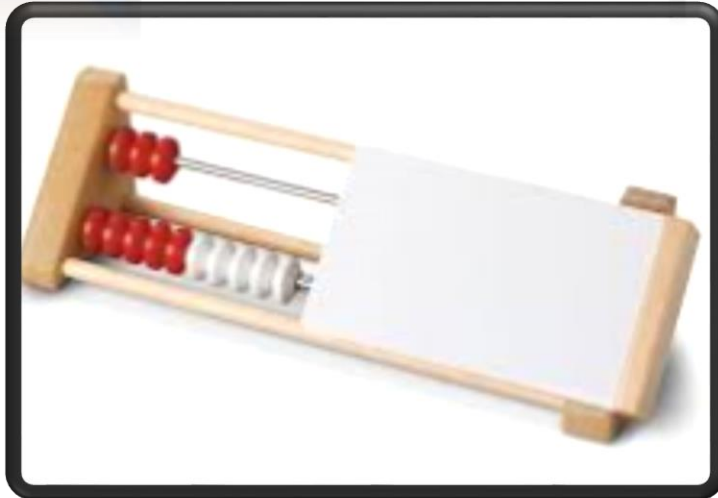
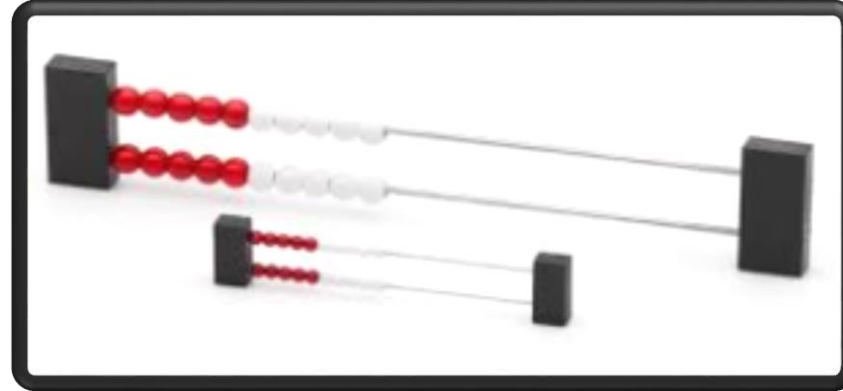
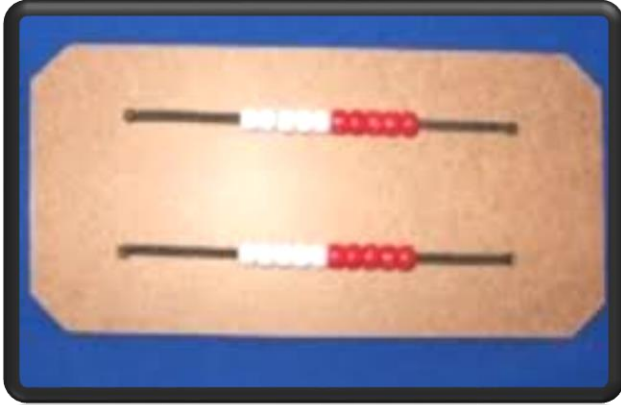


14



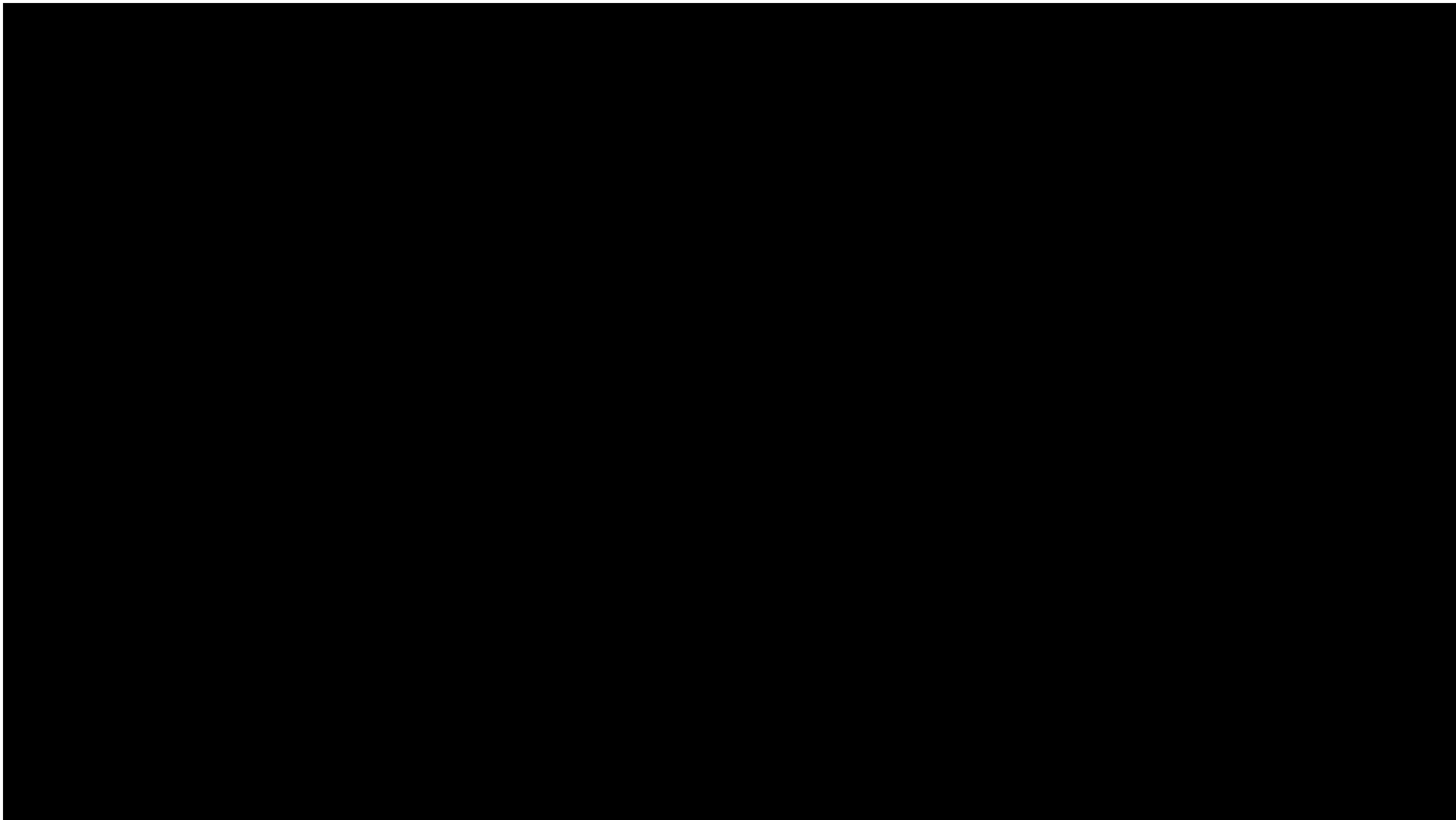
Tool #6

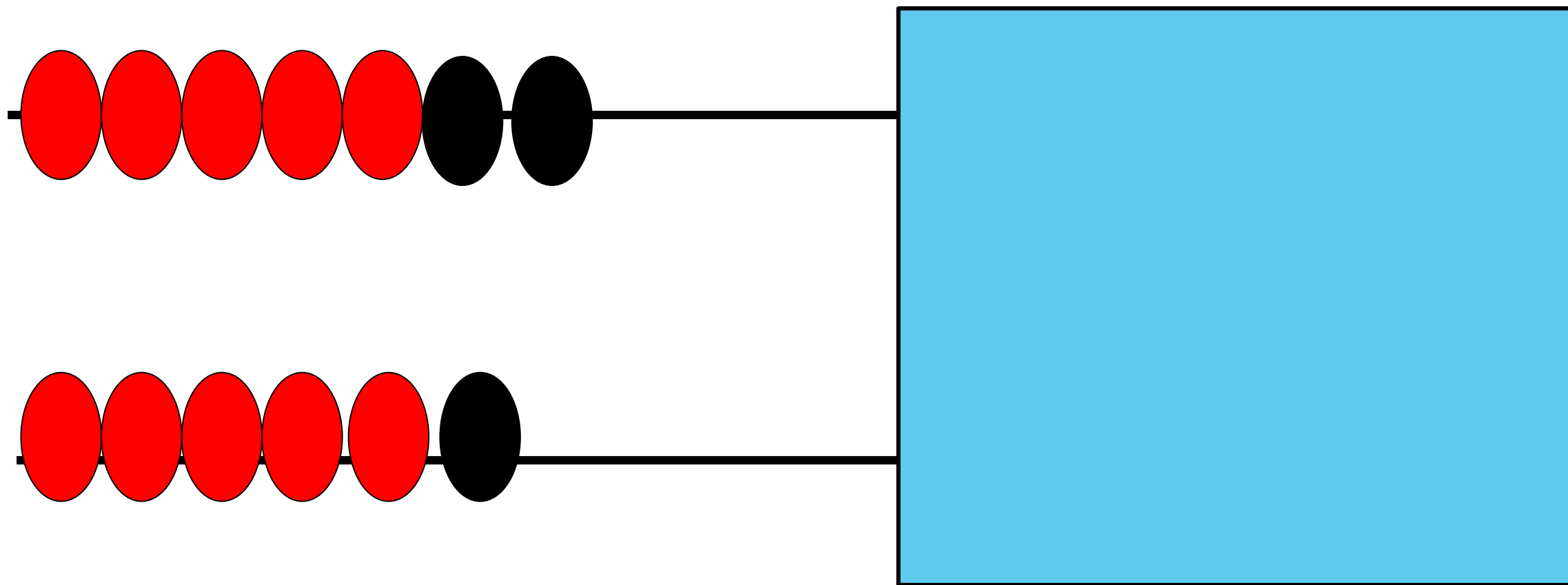
Rekenreks or Math Rack



Math Rack Youtube Video







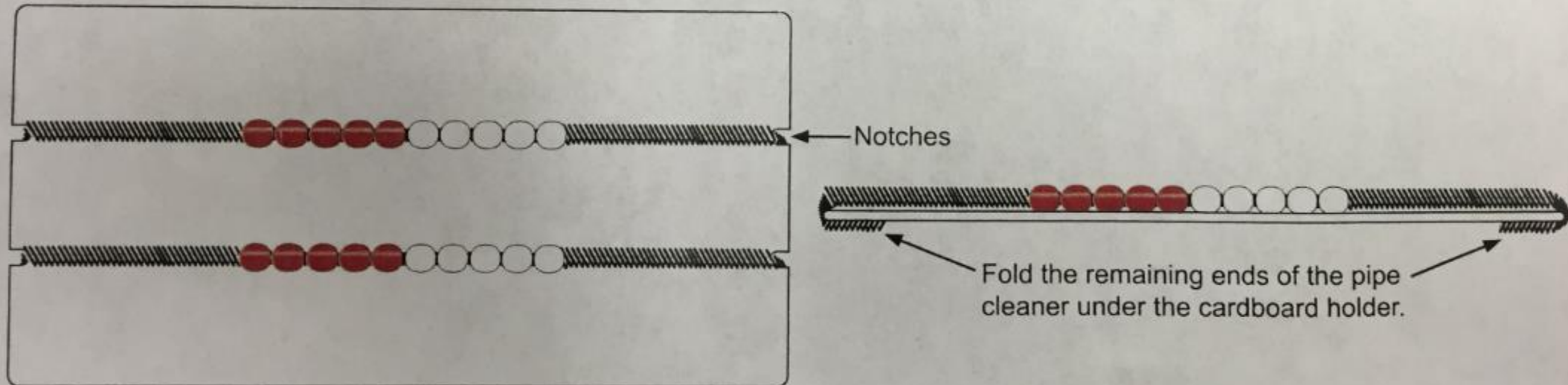
To Make Your Rekenrek:

Materials:

- 1,000 Red Beads
- 50 Cardboard Holders
- 1,000 White Beads
- 100 Black Pipe Cleaners

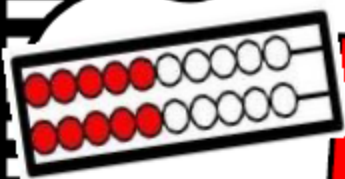
Instructions:

1. Place 5 red beads and then 5 white beads on a pipe cleaner.
2. Take the pipe cleaner with beads and wrap it on the cardboard holder, using the notches to secure it in place.
3. Repeat for an additional Rekenrek.
4. You can place 1 or 2 Rekenreks on the cardboard holder.



Let's practice using
the rekenrek.





Rekenrek Activities

- | | |
|-----------------|---|
| How Many? | Call out a number and have the students build it. |
| Show Me! | Show students a subitizing card of dots or ten frames. Students build what they see. |
| What's Hiding? | Show some beads, hide the other beads with paper, and ask how many are hiding behind the paper. |
| Copy Me! | Show students an amount of beads and they copy. |
| More/Less | Students make a number and then show one more or one less. |
| Story Time | Tell a story and the students solve. |
| How Many to 10? | Show an amount and students figure out how many more to get to 10. |



Tool #7

100 Bead String

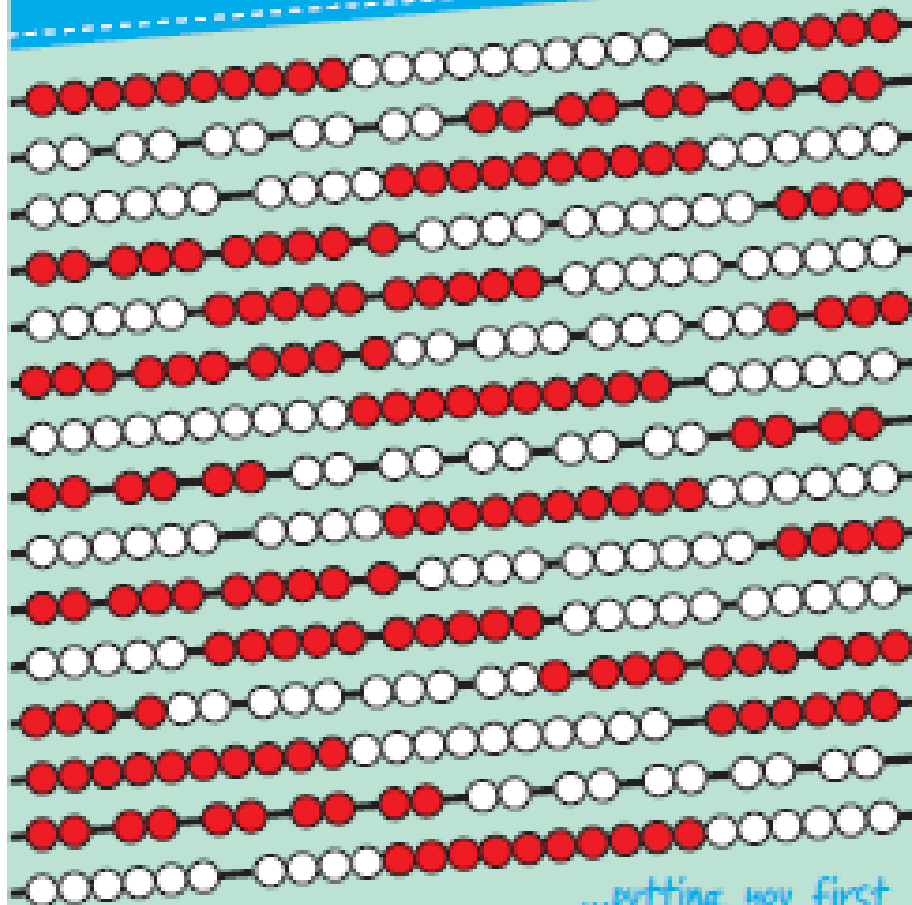


2.OA.1 Use addition and subtraction within 100 to solve one-and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.



33 Ways To Use A 100 Bead String

K
C
S



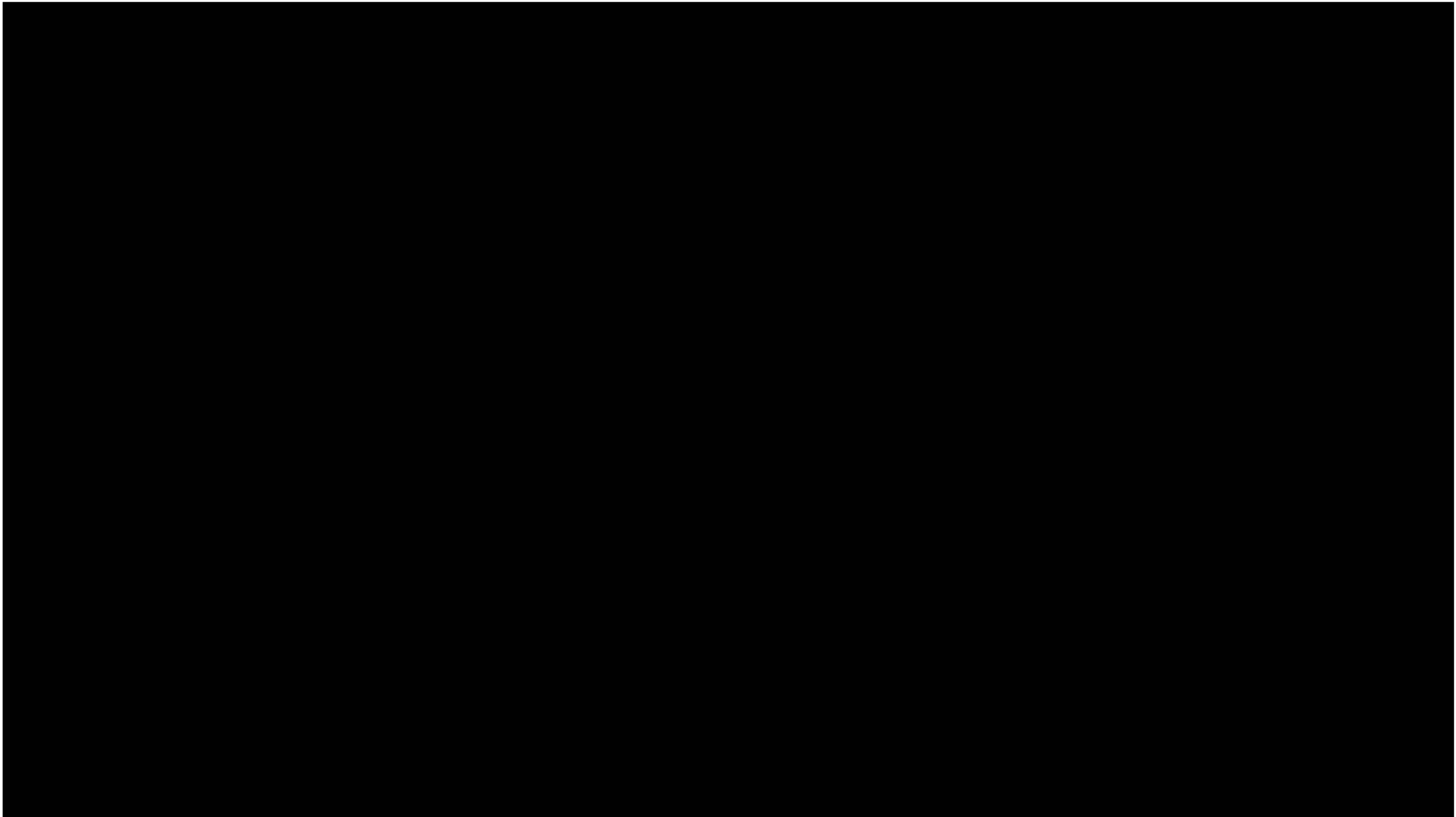
...putting you first



Are you ready to subitize?

Subitizing:
*Instantly recognizing
quantities*

The image shows two hands, palms facing forward, with all five fingers extended. The hands are positioned behind the text, which is overlaid on the image. The text is in a mix of serif and cursive fonts. The word 'Subitizing:' is in a large, black, serif font. Below it, the phrase 'Instantly recognizing quantities' is written in a smaller, black, cursive font. The hands are light-skinned and are set against a plain white background.



3.OA.3

I can solve word problems about arrays and equal groups. I can write the matching multiplication and/or division sentence.



phillipmartin.info



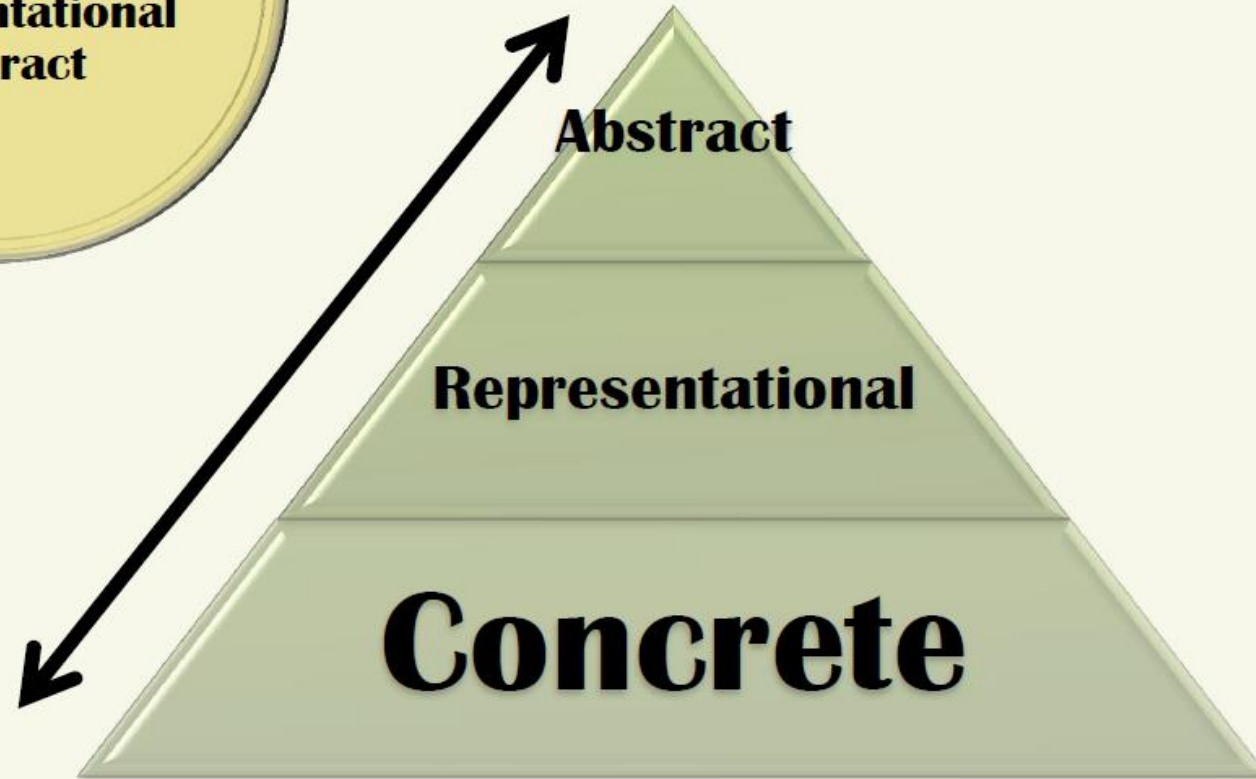
Tool #8

100 Bead Abacus



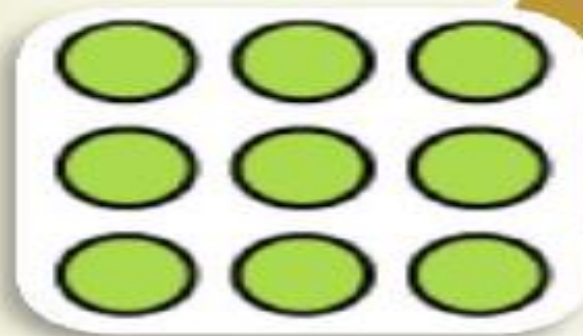
CRA

**concrete
representational
abstract**





Concrete



Representational

3×3

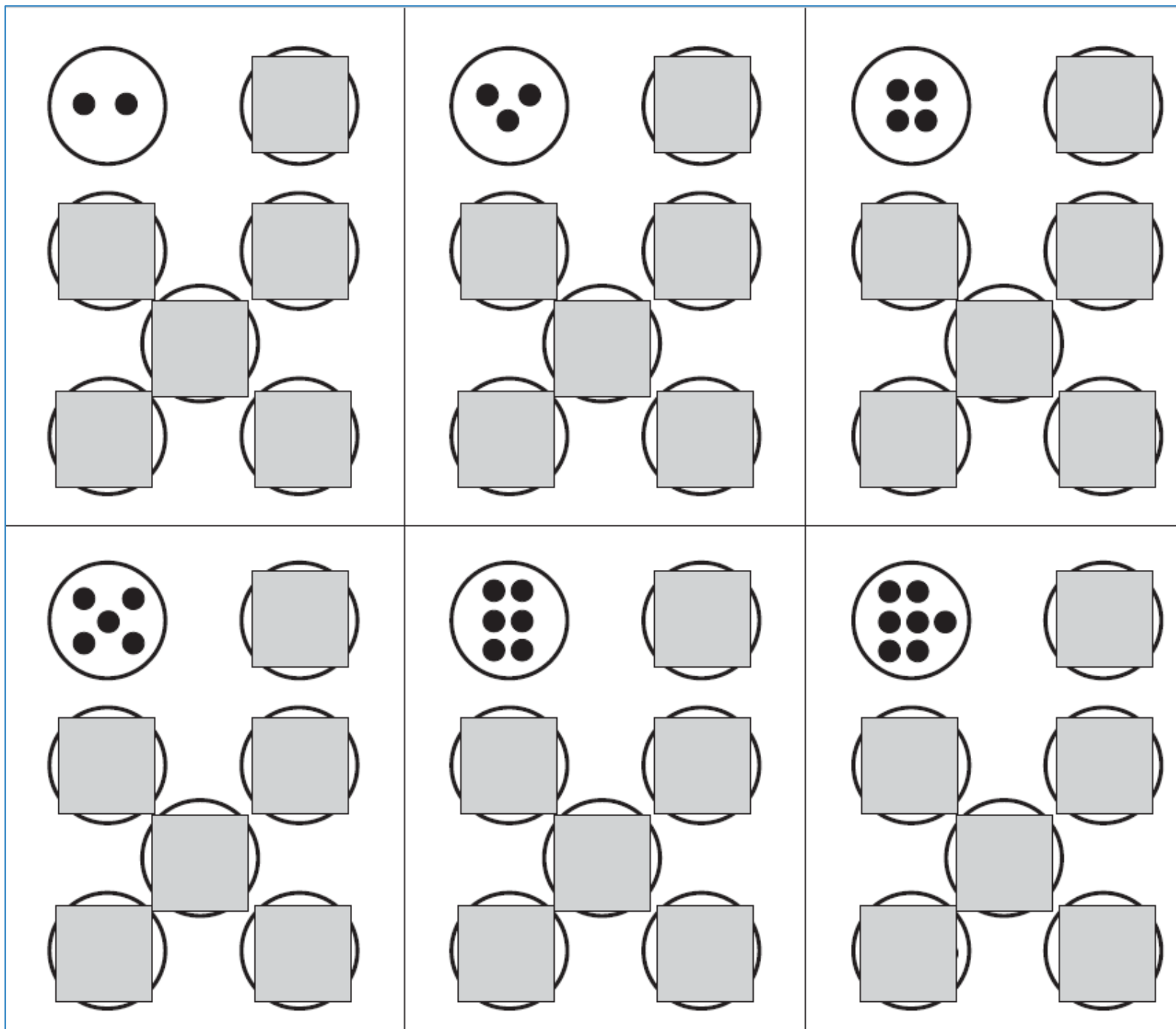
Abstract



Tool #9

Circle Array Cards

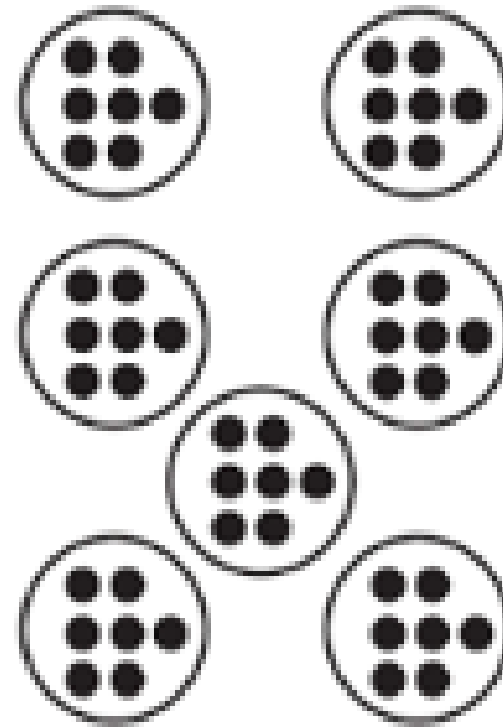




Abstract



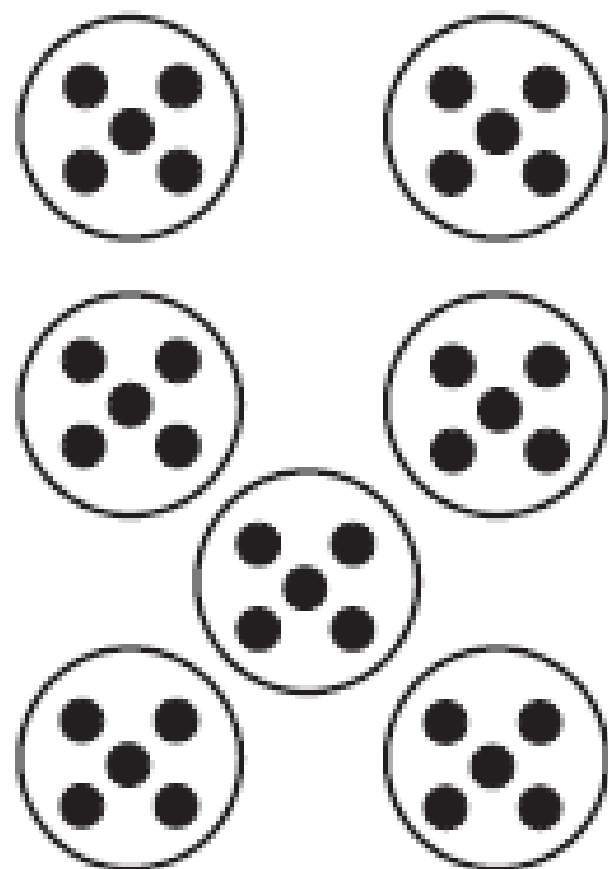
Quantitative

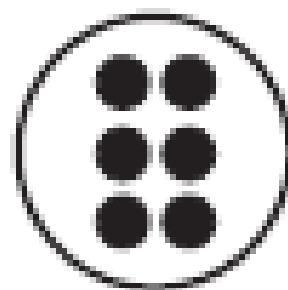
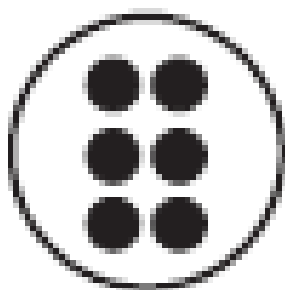
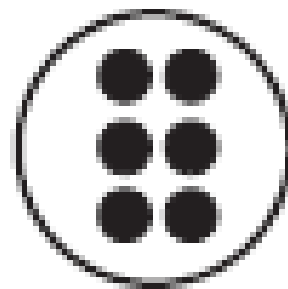
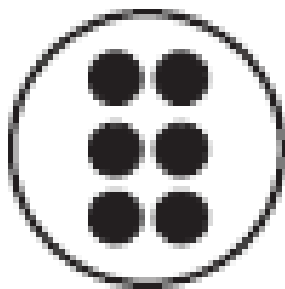
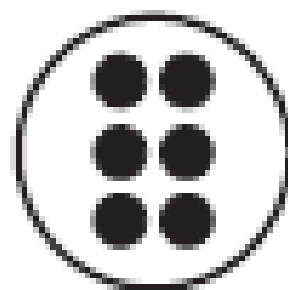
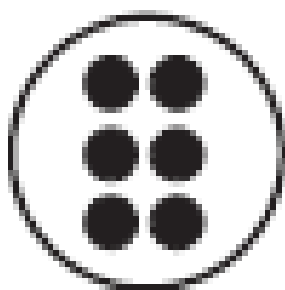


Are you ready to subitize?









Multiplication War

Multiplication War

I can multiply multi-digit numbers.

Grade: 5th

Standard(s):

- 5.NBT.B.5 Multi-digit multiplication

What you need/ Materials:

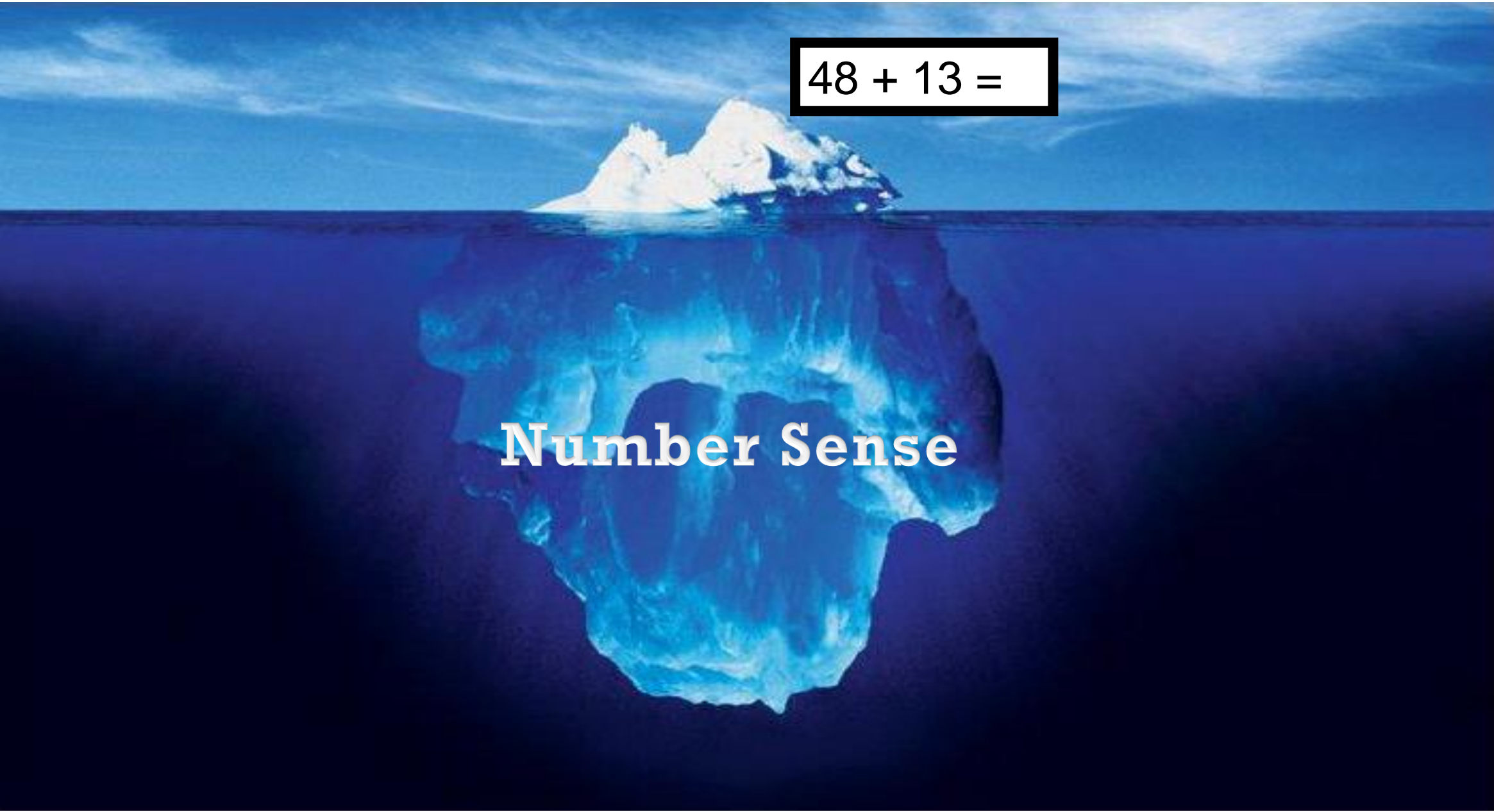
- Circle multiplication array cards

Directions:

Shuffle cards well and place them face-down in a pile. Player #1 turns over two cards and multiplies them. Player #2 does the same. The player with the highest product (answer) collects all four cards. In case of a tie, each player turns over two more cards and multiplies them. The player with the highest product collects all 4 cards.

The winner is the player with the most cards when the pile has been used up.



An iceberg floating in a deep blue ocean under a clear sky. The small tip of the iceberg is above the water, while the much larger, more complex structure is submerged. The text '48 + 13 =' is in a box above the tip, and 'Number Sense' is written across the submerged part.
$$48 + 13 =$$

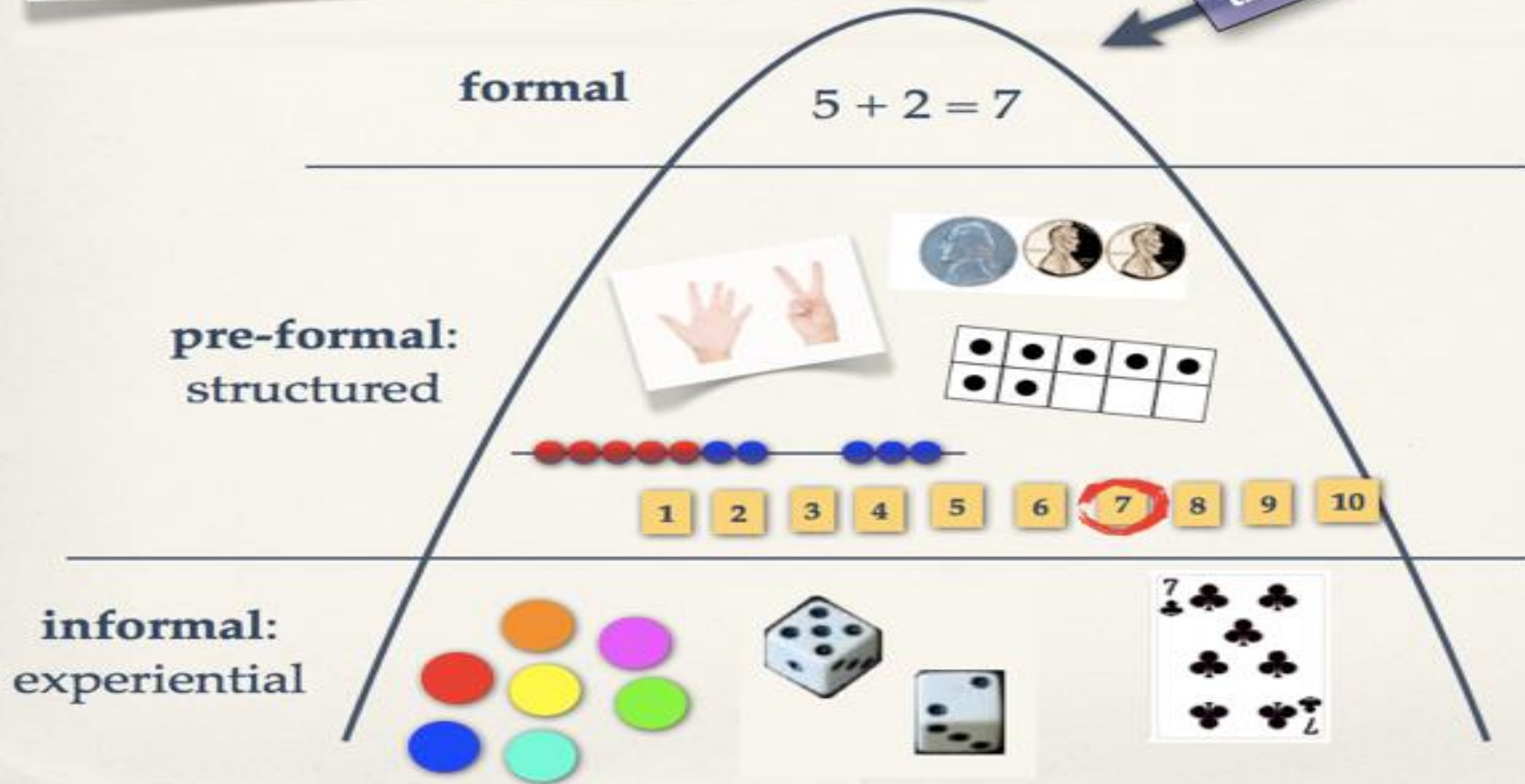
Number Sense

Teaching for Depth ...based on the work of David Webb, Freudenthal Institute



The Iceberg Metaphor

David Webb, Executive Director, Freudenthal Institute USA



Amber Barrett
BARRAM@FUSD.NET

Jackie Piddington
PIDDJ1@FUSD.NET

Mary Dickerson
DICKMK@FUSD.NET

